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R A REVIEW OF THE GENUS *ANKOTHRIPS* D. L. CRAWFORD (Thysanoptera)

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The present status of the family Melanthripidae has recently been reviewed by the writer (Pan-Pacific Ent. 15(4):168-172, 1939). Priesner (1936) has prepared a review of the genus *Melanthrips* Hal., and *Dactuliothrips* Moulton is summarized in the first mentioned paper. *Dorythrips* Hood, and *Cranothrips* Bagn. each contain at present only one species. The remaining known genus in this family, *Ankothrips* D. L. Crawford is here reviewed.

Through the kindness of Hood, Priesner, Moulton, and the Canadian National Museum, it has been possible to study types, paratypes, or homotypes of all the known species of *Ankothrips*. Since D. L. Crawford established this distinctive genus in 1909 for *robustus* (designated the genotype by Bagnall, 1913) eight additional species have been described. A key to the known species, the description of a new form, and such biological information as is known concerning the California representatives are here presented.

Bagnall (1913) placed *Dicranothrips* Trybom and *Priono-
thrips* Schille in synonymy with *Ankothrips*. Hood (1924) pointed out the very interesting coincidence that, "In 1909 and 1910 three students of the Thysanoptera, situated in widely separated parts of the world, described almost simultaneously three species of *Æolothripidae* which were remarkable for certain structural characters previously unknown in the group. Each erected a new genus for the reception of the species known to him; yet, oddly enough, though coming from South Africa, Galicia and California, respectively, these three species were congeneric." Priesner (1926, p. 86) reviewed the status of the genus up to that date. The same author (1939) reestablished *Priono-
thrips* as a subgenus for *mavromoustakisi* Pr. and *niezabitoskii* (Shille).

The outstanding generic characters which separate *Ankothrips* from other genera in the Melanthripidae are as follows: The projection of the second antennal segment, the anterior pro-

jection of the vertex, the lack of tarsal claws and tibial spurs, and the transverse horse-shoe shaped sensory areas on antennal segments III and IV.

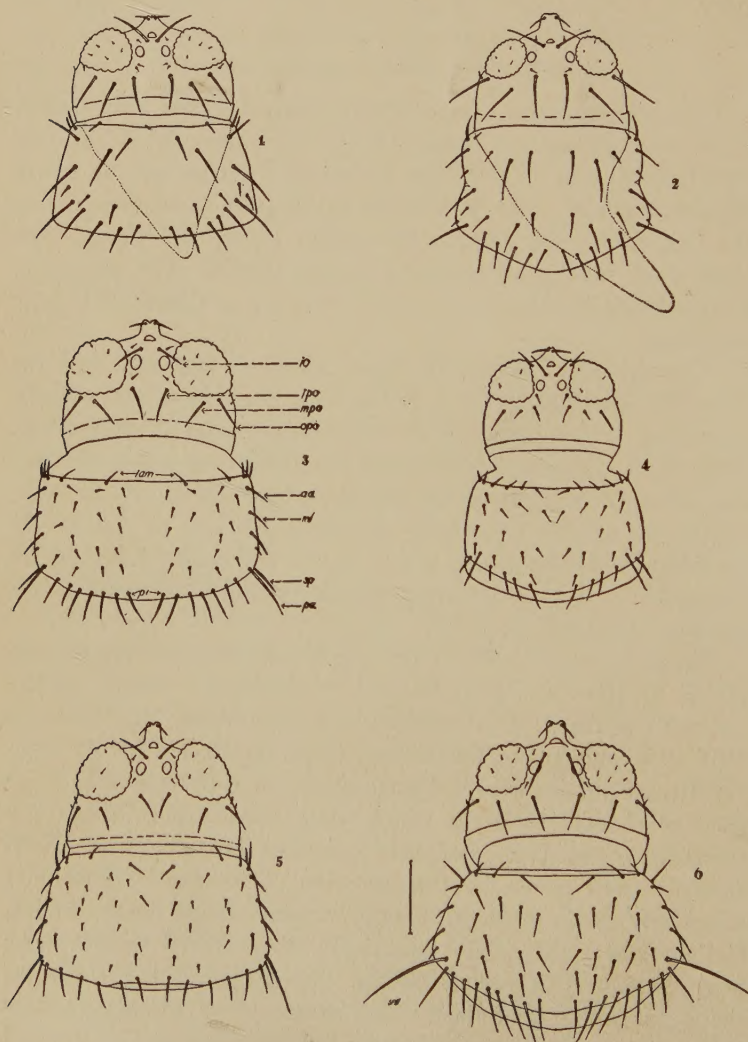


Plate I. *Ankothrips*. Head and pronotum of: 1, *niezabitowskii*; 2, *mavromoustakisi*; 3, *vandykei*; 4, *gracilis*; 5, *æqualis*; 6, *notabilis*. Scales: Plate II, Figure 3, line equals 0.1 mm. All other figures in Plates I, II, and III are to same scale as in Plate I, fig. 6, Plate II, fig. 4, and Plate III, fig. 9, i.e., line equals 0.1 mm.

The diversity in the genus is not great, although the individual species exhibit considerable variability when studied in long series. For example, occasional individuals are seen with the antennal projection missing on one or both antennæ, the notches or serrations on the antennal projections are variable, and the number of bristles on the pronotum sometimes fluctuates.

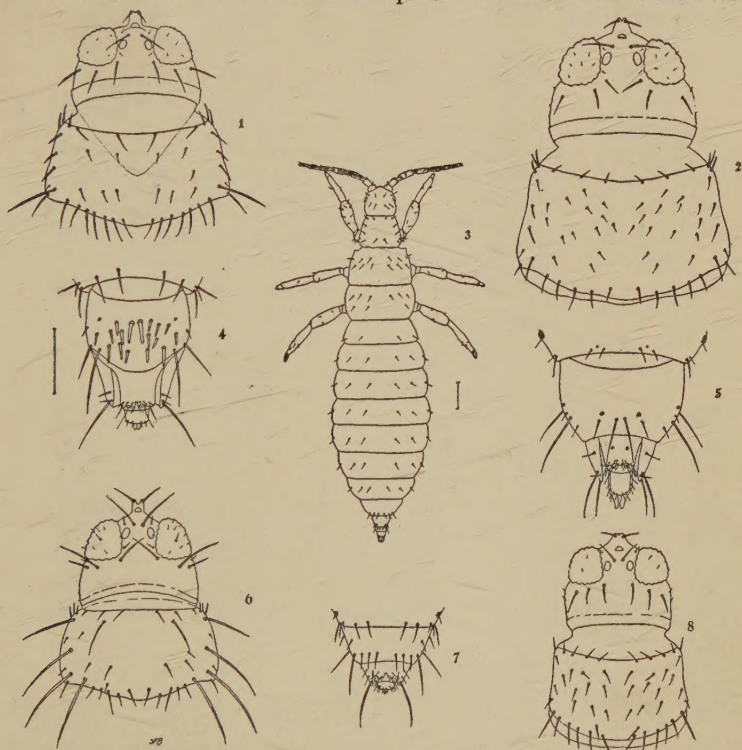


Plate II. *Ankothrips*. Head and pronotum of: 1, *robustus*; 2, *yuccæ*; 6, *fissidens*; and 8, *diffractus*. Genitalia of males of: 4, *robustus*; 5, *yuccæ*; and 7, *gracilis*. Figure 3, mature larva of *yuccæ*.

In the known males of those species having very heavy bristles on the dorsum of the terminal abdominal segments, namely, *æqualis* Moulton, *robustus* D. L. Crawford (Plate II, fig. 4), and *notabilis* Bailey, there is also variability in the number and placement of these bristles. As the males of more species become known the genitalia (Plate II, figs. 5 and 7) will be used more successfully than is now possible. Good specific char-

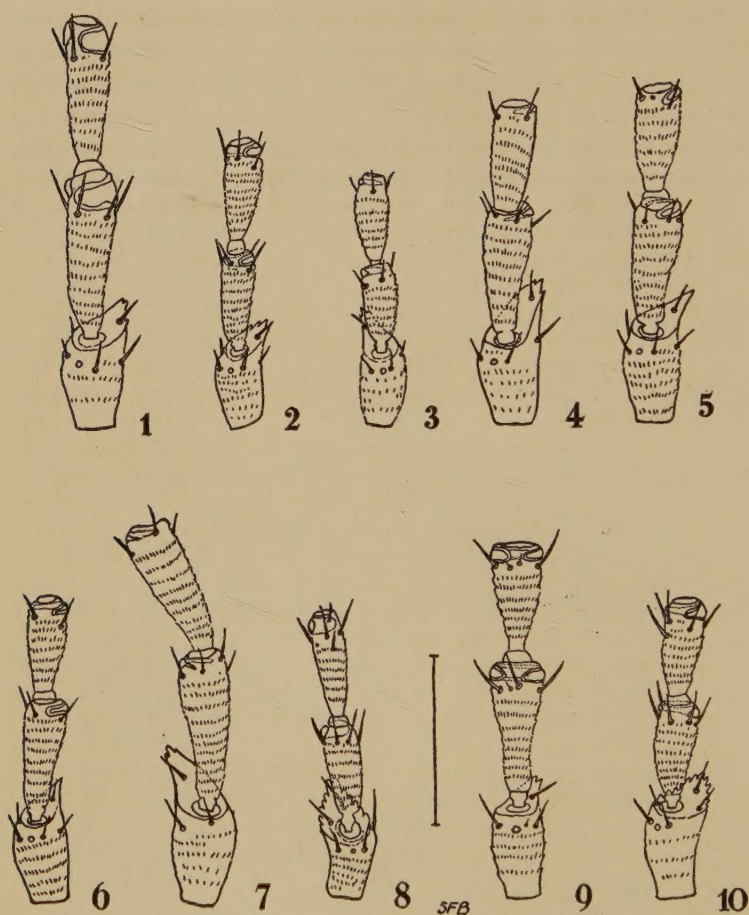


Plate III. *Ankothrips*. Second, third, and fourth antennal segments of: 1, *yuccæ*; 2, *gracilis*; 3, *diffRACTUS*; 4, *vandykei*; 5, *notabilis*; 6, *robustus*; 7, *æqualis*; 8, *mavromoustakisi*; 9, *fissidens*; and 10, *niezabitowskii*.

acters are also to be found in the chætotaxy of the pronotum and dorsum of the head. It should be noted that the antennal sensory areas on the third and fourth segments do not offer such distinct specific characters as in *Melanthrips* although there are marked differences (Plate III, fig. 1-10). The nomenclature of the bristles of the pronotum as here used is adapted from Priesner (1936) (Plate I, fig. 3).

KEY TO THE SPECIES OF ANKOTHRIPS

1. (10) Mouth cone very long and pointed, extending considerably beyond posterior margin of pronotum (Plate I, figs. 1 and 2). Ovipositor very long.....Subgenus *Prionothrips* Pr. 10
- Mouth cone short and blunt, not extending beyond posterior margin of prothorax (Plate II, fig. 1).....2
2. (1) Projection on vertex over-hanging base of antennæ wider at base than at tip (Plate II, fig. 2).....3
- Projection of vertex over-hanging base of antennæ with sides parallel¹ (Plate II, fig. 6).....6
3. (2) Sensory areas on antennal segments III and IV very broad, about one-fifth the length of the segment and extending almost entirely around the segment (Plate III, fig. 1). Projection on antennal segment II toothed or serrate on outer margin only.*yuccæ* Moulton
- Sensory areas on antennal segments III and IV narrow and extending little more than half way around segment at tip....4
4. (3) Median post-ocular bristles very short (0.016 mm.) and with micro-setæ between inner margin of eye and anterior ocellus strongly developed (Plate I, fig. 4).....*gracilis* Moulton
- Three post-ocular bristles well-developed.....5
5. (4) Posterior-angular bristles (pa) on pronotum 0.075 mm. long; sp bristles 0.052 mm.; with three strong lateral bristles on pronotum (Plate I, fig. 3).....*vandykei* Moulton
- Pa bristles 0.052 mm.; sp bristles absent; lateral bristles on pronotum weak or absent (Plate II, fig. 8).....*diffRACTUS* Hood
6. (2) Projection of vertex with a deep U-shaped notch at tip (Plate II, fig. 6). Median post-ocular bristles longer (0.072 mm.) than the inner or outer ones. Mid-lateral bristle (ml) very long (0.089 mm.).....*fissidens* (Trybom)
- Projection of vertex with shallow V-shaped notch.....7
7. (6) Projection on second antennal segment simple—without notches or serrations on margin.....8
- Projection on second antennal segment notched on one or both sides near tip 9
8. (7) All bristles on head and pronotum strongly developed; inter-ocular bristles 0.069 mm., pa bristles very long (0.115 mm.) (Plate I, fig. 6). Pronotum and portions of head, legs, and thorax golden yellow.....*notabilis* Bailey
- Bristles on head and pronotum moderately well developed; interocular bristles 0.049 mm.; pa bristles 0.085 mm. (Plate II, fig. 1). Body uniform dark brown.....*robustus* Crawford
9. (7) Projection on vertex slightly wider at base than at tip. Pronotal bristles iam 0.023 mm. Interocellar bristles 0.046 mm. (Plate I, fig. 3). Color yellow to orange brown.....*vandykei* Moulton

¹Measurement of the one paratype of *vandykei* in the writer's collection shows the projection to be slightly wider at the base than at tip; width at tip 0.022 mm., width at base 0.028 mm.

- Projection on vertex more slender with sides straight. Pronotal bristles iam 0.029 mm. Interocellar bristles 0.039 mm. (Plate I, fig. 5). Color yellow to orange-yellow with bristles dark brown; abdominal segments 2-7 each with dark brown transverse line on anterior margin of sternum.....*aqualis* Moulton
10. (1) Ovipositor 0.637 mm. long. Head produced in front of eyes and projection with sides nearly parallel (Plate 1, fig. 2). Antennal segments I and II light brown, remainder dark brown*mavromoustakisi* Pr.
- Ovipositor 0.455 mm. long. Head scarcely produced in front of eyes and projection with base much wider than tip (Plate I, fig. 1). Antennal segment I light brown, remainder dark brown.....*nieszabitoskii* (Shille)

Ankothrips notabilis Bailey, new species

Plate I, fig. 6. Plate III, fig. 5.

Female: Basal portion of head with dark brown collar, remainder light brown to golden brown. Prothorax yellow to golden brown; remainder of body uniform dark brown. Eyes dark brown to black, marginal ocellar pigment crimson. Antennæ dark brown, base of segment III light brown to gold, segments I and II somewhat lighter than anterior segments. Femora dark brown, yellowish-brown at tip. Tibiæ light golden brown, middle and hind tibiæ darker in center. Wings fuscous, hind wing lighter than fore wing. Bristles moderately strong, dark brown to black at tip of abdomen, light brown to gold on remainder of body.

Head about one-third wider than long, cheeks pronouncedly arched behind eyes, with a collar-like ridge at posterior, micro-setæ on compound eyes between facets. Three ocelli, anterior ocellus at base of projection and directed forward. Head transversely reticulate behind eyes. Mouth cone short and rounded. Antennæ moderately slender, nine-segmented. Segment II projected on under side in the manner typical of the genus. Rings or annulations on all segments but indistinct on segment I. Segments III and IV with narrow sensory band at tip extending two-thirds of distance around segment. *Prothorax* about one-third wider than long, bristles long and well-developed. Fore and middle tibiæ with two short spines at tip. Hind femora thickened. Wings broad and rounded at tip, entire surface of both wings covered with micro-setæ. Fore wing with two longitudinal veins and three distinct cross-veins; fore longitudinal vein with 25-30 bristles, posterior longitudinal vein with 22-26 bristles. Hind wing with a thickening near base on costal margin and a central vein or darkened area extending a short distance from base. *Abdomen* broadly ovate, bluntly rounded at tip. Transverse striations weak on dorsum of all segments except first.

Measurements of type: Total body length (exclusive of antennæ): 1.89 mm.; head, length (including projection) 0.15 mm.; width, 0.19 mm.; prothorax, length 0.15 mm., width 0.27 mm.; mesothorax, width, 0.37 mm.; abdomen, greatest width (at 4th segment), 0.40 mm. Length of antennal segments in mm.: I, 0.029; II, 0.052; III, 0.079; IV, 0.066; V, 0.049; VI, 0.052; VII, 0.029; VIII, 0.019; IX, 0.033; total length (including intersegmental membranes), 0.455. Length of spines in mm.: io, 0.056; ipo, 0.049; mpo, 0.042; opo, 0.049; iam, 0.036; aa, 0.046; ml, 0.033; pl, 0.049; sp, 0.062; pa, 0.095.

Male: Smaller and more slender than female. Tip of abdomen spatulate and turned upward. Total body length (including projection on vertex) of allotype 1.65 mm.

Described from nineteen females and ten males collected by the author in California laurel flowers in Mix Canyon, Solano County, California, on February 1 and 14, 1939. Additional specimens of the type series are in alcohol, as well as a long series of slides from the same locality from manzanita and plum blossoms, February and March, 1935 and 1936. This species has also been collected by the writer from Arroyo Seco, Los Angeles County; on *Ceanothus*, near Wilbur Springs, Colusa County; on manzanita, at McDonnell Creek, Sonoma County, California. Additional specimens have been collected by R. M. Bohart at Cajon Pass on *Ceanothus* and by W. A. Brereton in San Gabriel Canyon from "flowers of a woody shrub."

Type locality, Mix Canyon, Solano County, California. Holotype slide (T16) and allotype (T17) in writer's collection.

The complete life history of none of the species of this genus of thrips has been worked out in detail. However, during the past eight years, the writer has collected and observed *robustus*, *gracilis*, *yuccæ*, and *notabilis* in California and a few generalizations can be made regarding their biology. These species have only one generation a year which is correlated with the blooming of their native hosts. The earliest species to appear, following the rains of the winter season (in January) is *notabilis*. Later *robustus* appears and it may be found up to May at altitudes of about 3,000-4,000 feet. In April, May, and June, *yuccæ* may be found in yucca flowers, particularly in southern California. The preferred host of *gracilis* appears to be *Adenostoma fasciculatum* and this thrips is to be found commonly in its flowers in May and June. Judging from these four species, these thrips are plant feeders only. The larvæ are

found in the late blooms of the host plants and disappear rapidly as the blooming period passes. The larval period lasts about two weeks.

In the laboratory the larvæ of *yuccæ* and *gracilis* have been found to spin cocoons in the soil. Therefore, it is safe to say that in the field pupation occurs in the soil beneath the hosts. The life history of these species may be compared with that of the pear thrips, *Teniothrips inconsequens* (Uzel).

As in the case of the above-mentioned crop pest, these *Ankothrips* species fluctuate greatly in numbers from year to year. When conditions are favorable the larvæ of *yuccæ* (Plate II, fig. 3) may be found by the thousands in yucca flowers. The most widespread species in California appears to be *robustus*; *gracilis* and *yuccæ* can be considered common, *notabilis* common in certain definite, widely-separated localities, and *æqualis* is rare. The latter species is apparently known only from the original collection; it may be found to be a coastal species only. Concerning the other two North American species, *diffRACTUS* and *vandykei*, nothing is known except the data of the original collections.

The exotic species, *fissidens*, *neizabitoskii* and *mavromoustakisi*, appear to be common and also occur in numbers in the spring only.

Insufficient data are at hand to formulate any general conclusions relative to the world distribution of this genus. Nevertheless, it should be pointed out that in North America this group of thrips is known only from the arid, semi-desert regions. Further and more thorough early spring collecting in other regions having a similar climate in western North America, as well as in South America and Africa, will undoubtedly disclose additional undescribed forms.

CATALOG OF THE SPECIES OF ANKOTHRIPI

1. *A. robustus* D. L. Crawford. 1909. Genotype. North America (California—widely distributed). Common in flowers of *Ceanothus* and manzanita; also found in prune blossoms and by sweeping.
2. *A. (PrionoThrips) neizabitoskii* (Shille). 1910. Poland and Hungary. February to May on *Juniperus communis*.

3. *A. fissidens* (Trybom). 1910. (*Dicranothrips*). South Africa (Klein-Namaland). August, from leaves of "Pferdebusches." Form *major* taken in July on leaves of "Zuur-Klee."
4. *A. diffractus* Hood. 1924. North America (New Mexico). In May in flowers of *Cercocarpus montanus* Raf. (7600 feet).
5. *A. yuccæ* Moulton. 1926. North America (California). Common in spring in flowers of native yucca, chiefly in southern California (also Kern County).
6. *A. gracilis* Moulton. 1926. North America (California). Common in late spring and early summer in flowers of *Adenostoma fasciculatum*.
7. *A. æqualis* Moulton. 1926. North America (California and Washington). April and June. Recorded hosts are *Prunus*, *Spiræa corymbosa*, *Schizonotus discolor*, and *Sambucus glauca*.
8. *A. vandykei* Moulton. 1928. North America (Colorado). In June from unknown plant.
9. *A. (Prionothrips) mavromoustakisi* Pr. 1939. Cyprus. February, in turf with juniper trees nearby.
10. *A. notabilis* Bailey. North America (California). January to March in flowers of *Umbellularia californica* and *Ceanothus*.

REFERENCES

- Bagnall, R. S., 1913. A synopsis of the thysanopterous family Æolothripidæ. 2nd Interntl. Congr. Ent. Oxford, 1912, pp. 394-397.
- Bailey, S. F., 1939. A new species of thrips from the Mojave Desert. Pan-Pacific Ent. 15(4):168-172, 2 figs.
- Crawford, D. L., 1909. Some new Thysanoptera from southern California, I. Pomona Coll. Jour. Ent. 1(4):100-102, fig. 45, A-I, Dec.
- Hood, J. D., 1924. A new *Ankothrips* (Thysanoptera) from New Mexico. Bull. Brook. Ent. Soc. 19:66-68, June.
- Moulton, D., 1926a. New American Thysanoptera. Trans. Amer. Ent. Soc. 52(2):119-121, Plate V, figs. 1-3, June.
- 1926b. New California Thysanoptera with notes on other species. Pan-Pacific Ent. 3(1):19-21, figs. 1-4, July.
1928. A new Ankothrips from Colorado. Pan-Pacific Ent. 5(2):91-92, Oct.

- Priesner, H., 1926. Thysanopteren Europas, pp. 86-90. Wien.
1936. A preliminary review of the non-fossil species of the genus *Melanthrips* Hal. Bul. Soc. Roy. Ent. Egypt, 29:29-52, 2 plates.
1939. On some Thysanoptera from Cyprus (Part II). Bul. Soc. Fouad 1st d'Entom. 22:110-111.
- Shille, F., 1910. Nowe formy przyzencow (Thysanopterorum genera et species novæ). Akad. Wiss. Krakau, 45:11-38 (pp. 3-4 in separate).
1912. Materialien zu liner Thysanoptern=(Blasenfusze) und Collemboles=Faua Galiziens. Ent. Ztschr., 25:229, 230, 232, Jan. 20, figs. 1-3. Frankfurt.
- Trybom, F., 1910. Physapoda. Schultze's Zoologische und Anthropologische Ergebnisse einer Forschungsreise im westlichen und zentralen Sudafrica, IV, No. 1, pp. 147-150, Taf. IIIb, figs. 1-8.

ORNITHODOROS TURICATA IN CALIFORNIA

(Arachnida, Acarina)

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LB.

While working last summer for the George Williams Hooper Foundation for Medical Research, University of California, the writer collected a specimen of a tick which has since been identified as *Ornithodoros turicata* (Duges, 1876). This is the first time since 1908 that this species has been definitely found in California.

The tick was originally described by Duges from Mexico in the newspaper le Repertorio de Guanajuato. Banks in 1908 reported it from Florida, New Mexico, Arizona, and San Diego, California. In the last two instances it was taken from cattle. Several workers including Brumpt (1936), Neveu-Lemaire (1938), and Bishopp (1933) have suggested the presence of this tick in considerable numbers in California, particularly in the southern portion of the state, but as far as can be determined they were evidently making use of Banks' early publication. At the present time it is also reported to occur in Kansas as well as in the states previously mentioned.

The specimen in question, an early nymphal form, was collected from the ground squirrel, *Citellus beecheyi fisheri* Merriam,

at the San Joaquin Experimental Range 20 miles northeast of Madera, Madera County, August 20, 1939. The nymphal tick was brought to the laboratory and reared to the last nymphal stage at which time it was identified by Dr. R. A. Cooley of the Rocky Mountain Laboratory, Hamilton, Montana.

This species has been incriminated as a vector of the Texas strain of relapsing fever and has been shown to transmit this hereditarily (Kemp, Moursund, and Wright, 1934). Wheeler (1938) has been successful in experimentally transmitting *Trypanosoma cruzi* Chagas, the causative organism of Chagas disease, by means of this tick.

The presence of this tick so far north in the San Joaquin Valley presupposes a wider distribution in California than has previously been reported. Dr. C. M. Wheeler, of The George Williams Hooper Foundation for Medical Research, has informed the writer that he has some specimens of an *Ornithodoros* tick from ground squirrels in the same locality and from Raymond in Madera County. All are in an early nymphal stage and have yet to be identified. If these ticks prove to be *Ornithodoros turicata*, it would suggest a wide area of infestation in that region.

LITERATURE CITED

- Banks, N., 1908. A Revision of the Ixodoidea, or Ticks, of the United States. U. S. D. A. Bureau of Ent., Tech. Ser. No. 15, 60 pp., 10 plates.
- Bishopp, F. C., 1933. Ticks and the Role they Play in the Transmission of Diseases, Smithsonian Report for 1933:389-406, 8 plates.
- Brumpt, E., 1936. *Precis de Parasitologie* II, 5th ed., Paris, p. 1201.
- Kemp, H. A., W. H. Moursund, and H. E. Wright, 1934. Relapsing Fever in Texas IV. *Ornithodoros turicata* Duges: A Vector of the Disease. Amer. Jour. Trop. Med., 14:479-487.
- Neveu-Lemaire, M., 1938. *Traite d'Entomologie Medical et Veterinaire*, Paris, p. 437.
- Wheeler, C. M., 1938. Experimental infection of *Ornithodoros turicata* (Duges) with a Brazilian strain of *Trypanosoma cruzi* Chagas. Proc. Soc. Exp. Biol. and Med., 38:191-193.

TWO NEW CALIFORNIA DOLICHOPODIDÆ¹

(Diptera)

F. C. HARMSTON AND G. F. KNOWLTON²

The following report deals with two species of apparently undescribed long-headed flies collected in California during 1939.

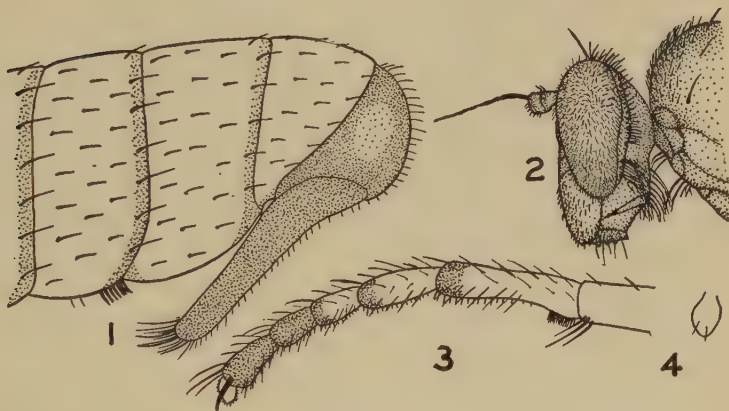
***Thinophilus scopiventris* Harmston and Knowlton, new species**

Male. *Length*, 5.8 mm.; of wing, 6 mm. *Face* moderately wide, narrowest just below antennæ, greenish, with coarse brownish pollen which is thicker below longitudinal facial ridge; palpi (fig. 2) large, brownish-yellow, each about one and one-half times as large as face and covered with short, stiff, black hairs; front about twice the width of face, coppery-green, except a metallic violet, triangular-shaped, central area immediately below ocellar tubercle: the portion of front immediately above antennæ and along orbits as far as occiput, lightly dusted with brownish-yellow pollen; antennæ black on upper half, yellow below, the third joint short, rounded at tip, the arista inserted near base above; lower orbital cilia and beard composed of stiff, yellowish-white hairs, among which are situated two short, black bristles; upper orbital cilia black. *Dorsum of thorax* and scutellum dusted with dark brown pollen which hides the greenish ground color except a central greenish vitta and posterior margin of mesonotum; lateral margins of scutellum shining greenish; one pair of large scutellar bristles outside of which is located a pair of small, hair-like bristles; pleuræ green, the anterior region dulled with brownish pollen, the posterior surface more greyish; calypters and halteres yellow, the former with delicate, whitish cilia. *Abdomen* metallic green with bronze reflections, dusted with grey pollen, the incisures blackish; bristles of thorax and abdomen entirely black; hypopygium (fig. 1) black, dulled with greyish pollen, rounded behind, with a pair of large, black, fleshy lamellæ, fringed with black delicate hairs which are long and curled at their tips; lamellæ reaching ventral hind margin of fourth abdominal segment, this margin not projecting below, but with a cluster of short, stiff bristles. *Coxæ* blackish green, dulled with greyish pollen; fore and middle pairs with coarse black hairs on anterior surfaces, the middle and hind pairs each with a long bristle on outside surface; femora and tibiæ brownish, nearly concolorous, yet the former nearly black on upper surfaces; all femora with strong bristles below, the posterior pair with six short bristles along apical half

¹Contribution from the Department of Entomology, Utah Agricultural Experiment Station.

²Research assistant and research associate professor of entomology, respectively.

of upper, outer surface; fore tarsi (fig. 3) with last two joints and tips of first three joints, black, their basitarsi somewhat hollowed below, with a cluster of stiff bristles at base below and longer hair-like bristles along outer, lower surface; middle tarsi with fifth segment and tips of other segments black; hind tarsi wholly black. (Femora of female lighter than in male.) *Wings* greyish hyaline, without spots or infuscations; third and fourth veins nearly parallel beyond cross vein, the fourth vein ending in apex of wing.



Figures 1-3. *Thinophilus scopiventris*, n. sp., male. Figure 4. *Chrysotus xanthocal*, n. sp.

Described from one male and one female taken at Newark, California, June 27, 1939, by G. F. Knowlton, along the margin of a small stream running through alkaline land. The type is deposited in the collection of the California Academy of Sciences.

Taxonomy. In general outward appearance *Thinophilus scopiventris*, n. sp., resembles *T. frontalis* V. D., described from Florida; it differs, however, in having a brush of short, coarse bristles on the ventral, posterior margin of the fourth abdominal segment, strong bristles along the lower edge of the posterior femora and in having the legs of much darker color. An interesting feature of *scopiventris* is the striking similarity of structure and color in the fore and middle tarsi with those of *T. spinipes* V. D., a common Utah species; the latter species

differs, however, in possessing a spot on the last portion of fourth vein and another on the cross vein, also in possessing wholly black femora.

Chrysotus xanthocal Harmston and Knowlton, new species

Male. *Length*, 2 mm.; of wing, 2 mm. *Face* narrow, showing greenish ground color lightly dusted with golden-yellow pollen between approximated eyes; front and occiput green, the former more bronze near middle and above base of antennæ; second and third antennal joints black, the latter small, somewhat triangular but with rounded tip, densely pubescent; first joint entirely yellow; arista about two and one-half times length of antenna; palpi (fig. 4) yellow, leaf-like, with two small blackish bristles near their tips; orbital cilia white, about five of the upper ones appearing brownish in certain lights, especially when viewed from behind. *Dorsum of thorax* shining metallic green, lightly dusted with yellow pollen along anterior and lateral margins; pleuræ of similar color to dorsum except that pollen is more dense and whitish. *Abdomen shining*, metallic green with bronze reflections; hypopygium more blackish, sub-shining, its appendages entirely imbedded; bristles of thorax and hairs of abdomen wholly black. *Fore coxæ* yellow, darkened at base, especially on outer face, their anterior surfaces with whitish hairs which are as long as the thickness of coxæ; middle and hind coxæ wholly dark, of greenish-black color; femora yellow; fore pair darkened along entire upper edge; middle pair entirely yellow; hind pair yellow with apical fifth blackened; fore and middle tibiæ yellow, hind pair brown; all tarsi blackish, without ornamentations; calypters yellow with black cilia; knobs of halteres lemon-yellow, their stems more brownish.

Described from one male, taken at Tracy, California, November 15, 1939, by F. C. Harmston and V. H. Harmston and deposited in the collection of the California Academy of Sciences.

Taxonomy. This species resembles both *Chrysotus terminalis* V. D. and *C. picticornis* Loew. From the former it is readily separated by the yellow palpi and the white hairs of the fore coxæ; both palpi and hairs of fore coxæ are black in *terminalis*. From *C. picticornis* it differs in having large, pendant palpi of a bright yellow color; the palpi of *picticornis* are small, whitish and lack the two bristles at their tips. *Chrysotus xanthocal*, n. sp., possesses apical fifth of posterior femora black, posterior tibiæ brown, whereas the corresponding structures in *picticornis* are wholly yellow.

A PRELIMINARY SYNOPSIS OF THE DRAGONFLIES OF NEVADA

BY IRA LA RIVERS

Reno, Nevada

Although Nevada is an area of almost extreme semi-aridity, still the as yet insignificant number of dragonfly captures within its boundaries have, to the best of my knowledge, yielded the rather substantial number of 63 species. This number is considered substantial because dragonflies are, as a group, restricted in their distribution in direct proportion to the available water supply, and Nevada's water supply probably averages less per unit mile than any other region of equal size in the United States. Only a very small portion of the vast reaches of the state has been collected over, much still remaining to be done along the Nevada-California border, where the western edge of the state meets the tall, humid Sierra, and where, no doubt, many species hitherto accredited only to the coast region will eventually be found crossing the line. A similar situation exists along the Nevada-Idaho and Nevada-Oregon borders, where numerous swift streams head on one of the Great Basin's northern divides, and flow north and west to the Pacific Ocean via the Snake and Columbia rivers. There is less to be expected along the Nevada-Utah line, since the boundary here is man-made, and stretches across salt flats, playas, and typical desert topographies which present much the same aspect, and contain much the same ecologic environments, in one state as in the other. The third portion of the state with considerable promise for future collecting is the southern tip, bordered on the south and east by the turbulent Rio Colorado, up whose broad waters many subtropical dragonflies have worked their way northward from Arizona, California, and Mexico. And last, but not least, is the fourth region of promise, the interior, higher Great Basin ranges such as those in central Nevada bearing the Nevada National Forest.

It is the purpose of the author to enlarge upon this list from time to time, as future collecting turns up additional species, until such a time as the accumulation of seasonal and biologic data is sufficient to warrant a more comprehensive synopsis of the state's dragonflies.

Order ODONATA "Recent Dragonflies"

Superfamily LIBELLULOIDEA "Dragonflies proper"

Family ÆSHNIDÆ "Darners"

Subfamily PETALURINÆ "Grays"

1. *Tanypteryx hageni* (Selys), "Western Grayling"—*Washoe County* (Cody Basin). Previous records: Muttkowski, 1910 ("Nevada"); Kennedy, 1917 ("Nev., Reno").

Subfamily GOMPHINÆ "Clubtails"

2. *Ophiogomphus occidentis* Hagen, "Western Grayclub"—*Washoe County* (Cody Basin). Previous records: No specific designations; Muttkowski, 1910 ("Canadian: British Columbia, Washington, Utah"); Essig, 1926 ("British Columbia, Washington, Oregon, California, Utah").
3. *Ophiogomphus montanus* (Selys), "Montana Grayclub"—*Elko County* (Gold Creek, Mountain City, Owyhee, Wild Horse Reservoir). Previous records: None.
4. *Ophiogomphus morrisoni* Selys, "Morrison Grayclub"—*Elko County* (Carlin, Elko); *Eureka County* (Beowawe, Palisade); *Humboldt County* (Winnemucca); *Pershing County* (Rye Patch Reservoir); *Washoe County* (Truckee Meadows, Wadsworth). Previous records: Muttkowski, 1910 ("Nevada, California"); Kennedy, 1917 ("Reno, Lower Truckee River, Carlin, Golconda"); Essig, 1926 ("Washington, Oregon, California, Nevada").
5. *Ophiogomphus bison* Selys, "Bison Grayclub"—not seen. Previous records: No specific designations; Muttkowski, 1910 ("Lower Sonoran: California, Nevada").
6. *Herpetogomphus designatus* Hagen, "Common Redclub"—*Lincoln County* (Pahrangat Valley). Previous records: None.
7. *Herpetogomphus compositus* Hagen, "Western Redclub"—not seen. Previous records: Muttkowski, 1910 ("Oregon and Wyoming to Arizona and Texas, California"); Kennedy, 1917 ("Lower Truckee River, Carlin, Lovelock"); Essig, 1926 ("Oregon, California, Nevada, Wyoming, Arizona").

8. *Gomphus intricatus* Hagen, "Intricate Clubtail"—*Pershing County* (Rye Patch Reservoir). Previous records: Kennedy, 1917 ("*Golconda, Lovelock*").
9. *Gomphus olivaceus* Selys, "Olivaceous Clubtail"—*Pershing County* (Lovelock). Previous records: Kennedy, 1917 ("*Golconda, Winnemucca, Lovelock*").

Subfamily ÆSHNINÆ "Darners proper"

10. *Anax junius* (Drury), "Common Zilia"—*Churchill County* (Carson Sink); *Clark County* (Boulder Lake, Rio Colorado); *Elko County* (Carlin, Elko); *Eureka County* (Beowawe, Palisade); *Humboldt County* (Golconda, Paradise, Winnemucca); *Lander County* (Battle Mountain); *Lincoln County* (Caliente, Pahrnagat Valley, Panaca, Pony Spring); *Lyon County* (Smith Valley, Yerington); *Mineral County* (Schurz); *Pershing County* (Imlay, Lovelock, Mill City, Rye Patch Reservoir); *Washoe County* (Truckee Meadows, Wadsworth, Washoe Lake). Previous records: Muttkowski, 1910 ("*Entire North America*"); Kennedy, 1917 ("*Golconda*").
11. *Æshna californica* (Calvert), The "California Blue"—*Washoe County* (Cody Basin, Truckee Meadows). Previous records: Muttkowski, 1910 ("*Upper and Lower Sonoran: British Columbia and California to Utah and Arizona*").
12. *Æshna multicolor* Hagen, the "Desert Blue"—*Clark County* (Boulder Lake, Corn Creek, Harris Spring, Las Vegas, Rio Colorado); *Elko County* (Carlin); *Eureka County* (Palisade); *Pershing County* (Rye Patch Reservoir); *Humboldt County* (Paradise); *Lincoln County* (Caliente, Pahrnagat Valley, Panaca); *Washoe County* (Truckee Meadows); *White Pine County* (Lehman Caves). Previous records: Muttkowski, 1910 ("*Upper and Lower Sonoran: British Columbia to Texas, Colorado and Panama*"); Kennedy, 1917 ("*Lower Truckee River, Golconda, Winnemucca*").
13. *Æshna umbrosa* Walker, the "Woodland Blue"—*Elko County* (Gold Creek, Jarbridge, Mountain City, Owyhee, Whiterock). Previous records: Muttkowski, 1910 ("*Canadian to Upper Austral: Atlantic to Pacific Coast*").

14. *Æshna palmata* Hagen, the "Palma Blue"—none seen. Previous records: Muttkowski, 1910 ("*Boreal: Pacific Coast, Kamchatka, Alaska to Colorado, Utah, B. Cal.*") ; Kennedy, 1917 ("*Reno, Carlin, Golconda*").
15. *Æshna constricta* Say, the "Common Blue"—*Pershing County* (Rye Patch Reservoir); *Washoe County* (Truckee Meadows, Wadsworth). Previous records: Kennedy, 1917 ("*Golconda*").
16. *Æshna interrupta* Walker, the "Elusive Blue"—not seen. Previous records: Kennedy, 1917 ("*Golconda*").

Subfamily CORDULEGASTERINÆ "Biddies"

17. *Cordulegaster dorsalis* Hagen, "Western Biddy"—*Washoe County* (Cody Basin, Peavine, Verdi). Previous records: None.

Family LIBELLULIDÆ "Skimmers"

Subfamily MACROMIINÆ "Belted Skimmers"

18. *Macromia pacifica* Hagen, "Western Waba"—*Washoe County* (Cody Basin). Previous records: No specific designations; Muttkowski, 1910 ("*Upper Austral: Wisconsin to Indiana, Texas, California*").
19. *Macromia magnifica* McLachlan, "Desert Waba"—*Elko County* (Carlin); *Eureka County* (Dunphy); *Humboldt County* (Mouth of Little Humboldt River); *Lincoln County* (Pahranagat Valley); *Pershing County* (Lovelock, Mill City, Rye Patch Reservoir); *Washoe County* (Wadsworth). Previous records: Kennedy, 1917 ("*Lower Truckee River, Golconda, Winnemucca*").

Subfamily LIBELLULINÆ "Skimmers Proper"

20. *Libellula saturata* Uhler, "Red Skimmer"—*Clark County* (Boulder Lake, Corn Creek, Harris Spring, Las Vegas, Rio Colorado, Stump Springs); *Elko County* (Gold Creek); *Eureka County* (Beowawe); *Lincoln County* (Caliente, Pahranagat Valley, Pony Springs). Previous records: No specific designations; Muttkowski, 1910 ("*Upper and Lower Sonoran: Montana and New Mexico to Baja California and Mexico*") Essig, 1926 ("*Montana, Colorado, Utah, California, Arizona, New Mexico*").

21. *Libellula forensis* Hagen, the "Eight Spot"—*Elko County* (Carlin, Elko, Deeth); *Eureka County* (Beowawe, Dunphy, Palisade); *Humboldt County* (Golconda, Mouth of Little Humboldt River, Paradise, Valmy, Winnemucca); *Lander County* (Battle Mountain); *Pershing County* (Lovelock, Humboldt, Imlay, Mill City, Oreana, Rye Patch Reservoir); *Lincoln County* (Pahranagat Valley); *Washoe County* (Truckee Meadows, Washoe Valley). Previous records: Muttkowski, 1910 ("*Upper Sonoran: British Columbia to California, Montana to Arizona*") ; Kennedy, 1917 ("*Reno, Carlin, Golconda*").
22. *Libellula quadrimaculata* Linné, "Cosmopolite Skimmer"—*Washoe County* (Cody Basin, Verdi). Previous records: No specific designations; Essig, 1926 ("*Northern Hemisphere, excepting the tropics. Throughout our western area*").
23. *Libellula nodisticta* Hagen, the "Four Spot"—*Elko County* (Elko); *Lincoln County* (Pahranagat Valley); *Pershing County* (Rye Patch Reservoir). Previous records: Muttkowski, 1910 ("*Upper Sonoran: Montana and Washington to California and Nevada; Mexico to Venez.*") ; Kennedy, 1917 ("*Golconda*").
24. *Libellula composita* Hagen, "White Eyes"—*Churchill County* (Carson Sink, Stillwater); *Lincoln County* (Pahranagat Valley); *Pershing County* (Rye Patch Reservoir). Previous records: Kennedy, 1917 ("*Lovelock*").
25. *Plathemis subornata* Hagen, "Desert Whitetail"—*Churchill County* (Carson Sink); *Elko County* (Carlin); *Lincoln County* (Pahranagat Valley); *Pershing County* (Rye Patch Reservoir). Previous records: Kennedy, 1917 ("*Golconda*").
26. *Sympetrum corruptum* (Hagen), "Common Toper"—*Churchill County* (Carson Sink, Fallon); *Clark County* (Boulder Lake, Corn Creek, Harris Springs, Hidden Canon, Las Vegas, Lee Canon, Overton, Rio Colorado, Stump Springs); *Douglas County* (Gardnerville, Topaz Lake); *Elko County* (Carlin, Deep Creek, Elko, Gold Creek, Jarbridge, Midas, Mountain City, North Fork, Owyhee); *Esmeralda County* (Fish Lake Valley); *Eureka County* (Beowawe, Dunphy, Palisade); *Humboldt County* (Golconda, Paradise, Winnemucca); *Lander County* (Battle

- Mountain); *Lincoln County* (Caliente, Pahrangat Valley, Panaca, Pony Springs, Quartz Spring); *Lyon County* (Fernley, Smith Valley, Yerington); *Mineral County* (Schurz); *Nye County* (Beatty); *Ormsby County* (Carson City); *Pershing County* (Lovelock, Humboldt, Imlay, Mill City, Oreana, Rye Patch Reservoir); *Storey County* (Virginia City); *Washoe County* (Dry Lake, Peavine, Pyramid Lake, Truckee Meadows, Verdi, Wadsworth, Washoe Lake); *White Pine County* (Duck Creek, Ely, Timber Creek). Previous records: Muttkowski, 1910 ("*Transition and Upper Austral: New York to Tennessee and Louisiana; Texas to Honduras, north to British Columbia; Asia; Sea of Ocholsk*") ; Kennedy, 1917 ("*Reno, Lower Truckee River, Pyramid Lake, Carlin, Golconda*").
27. *Sympetrum illotum* (Hagen), "Pacific Toper"—*Washoe County* (Truckee Meadows). Previous records: No specific designations; Muttkowski, 1910 ("*Transition and Upper Sonoran: Pacific Coast, British Columbia to California, Nevada*").
28. *Sympetrum madidum* (Hagen), "Western Toper"—not seen. Previous records: Muttkowski, 1910 ("*Upper Sonoran: British Columbia to California; Montana, Wyoming, Colorado*") ; Kennedy, 1917 ("*Carlin*").
29. *Sympetrum pallipes* (Hagen), the "Palip Toper"—*Churchill County* (Carson Sink); *Elko County* (Carlin, Elko, Mountain City); *Humboldt County* (Mouth of Little Humboldt River, Valmy, Winnemucca); *Pershing County* (Rye Patch Reservoir); *Washoe County* (Truckee Meadows). Previous records: Kennedy, 1917 ("*Reno, Lower Truckee River, Carlin, Golconda*").
30. *Sympetrum rubicundulum* (Say), "Rubic Toper"—*Elko County* (Carlin, Mountain City, North Fork); *Pershing County* (Rye Patch Reservoir); *Washoe County* (Dry Lake, Truckee Meadows). Previous records: Kennedy, 1917 ("*Reno, Carlin*").
31. *Sympetrum semicinctum* (Say), the "Red Toper"—*Churchill County* (Carson Sink); *Elko County* (Carlin, Elko); *Humboldt County* (Winnemucca); *Pershing County* (Lovelock);

- Washoe County* (Wadsworth, Derby). Previous records: Kennedy, 1917 ("*Lower Truckee River, Golconda*").
32. *Sympetrum costiferum* (Hagen), "Blacktail"—*Elko County* (Carlin); *Pershing County* (Rye Patch Reservoir); *Washoe County* (Truckee Meadows, Wadsworth). Previous records: Kennedy, 1917 ("*Reno, Golconda, Lovelock*").
 33. *Sympetrum danæ* (Sulzer), the "Dana Toper"—*Elko County* (Mountain City); *Pershing County* (Rye Patch Reservoir); *Washoe County* (Truckee Meadows). Previous records: Kennedy, 1917, as *S. scoticum* (Donovan) ("*Reno*").
 34. *Sympetrum atripes* (Hagen), the "Elusive Toper"—*Washoe County* (Truckee Meadows). Previous records: None.
 35. *Leucorrhinia glacialis* Hagen, "Jimmy Whiteface"—not seen. Previous records: Hagen, 1890 ("*Reno*").
 36. *Leucorrhinia intacta* (Hagen), "Johnny Whiteface"—not seen. Previous records: No specific designations; Essig, 1926 ("*British Columbia, Washington, Oregon, Nevada*").
 37. *Pachydiplax longipennis* (Burmeister), the "Blue Pirate"—*Clark County* (Las Vegas); *Lincoln County* (Pahranagat Valley); *Washoe County* (Truckee Meadows, Washoe Lake). Previous records: Muttkowski, 1910 ("*Austral to Gulf Strip: entire United States*").
 38. *Erythemis simplicicollis* (Say), "Green Jacket"—*Clark County* (Las Vegas); *Lincoln County* (Pahranagat Valley); *Pershing County* (Mill City, Rye Patch Reservoir); *Washoe County* (Truckee Meadows, Washoe Valley). Previous records: Muttkowski, 1910 ("*United States; Ontario to British Columbia to California; Montana to Texas, Mexico*"); Kennedy, 1917 ("*Golconda, Lovelock*").
 39. *Pantala hymenea* (Say), the "Two Spot"—*Clark County* (Boulder Lake, Las Vegas, Rio Colorado, Stump Springs); *Lincoln County* (Caliente, Pahranagat Valley, Quartz Spring). Previous records: None.
 40. *Pantala flavescens* (Fabricius), the "Globe Skimmer"—*Washoe County* (Cody Basin). Previous records: No specific designations; Muttkowski, 1910 ("*Cosmopolitan (circumequatorial); all continents, except Europe (Italy); North America: Alleghanian to Tropic; Maine and North Dakota to California and Florida*").

41. *Trapezostigma lacerata* Hagen, the "Common Master"—*Clark County* (Las Vegas, Searchlight); *Lincoln County* (Caliente, Pahrnagat Valley, Panaca). Previous records: No specific designations; Muttkowski, 1910 ("*Carolinian to Austroriparian: New York to South Dakota to California and Florida*").
42. *Trapezostigma onusta* Hagen, the "Brown Master"—*Washoe County* (Pyramid Lake). Previous records: No specific designations; Muttkowski, 1910 ("*Carolinian to Tropic: Ohio and Illinois to California and Florida*").

Superfamily AGRIONOIDEA "Damselflies"

Family AGRIONIDÆ "Janies"

Subfamily AGRIONINÆ "Janies proper"

43. *Agrion æquabile* (Say), "Western Blackwing"—*Elko County* (Mountain City). Previous records: None.
44. *Hetærina americana* (Fabricius), "Common Rubywings"—*Clark County* (Boulder Lake, Rio Colorado); *Lincoln County* (Caliente, Pahrnagat Valley). Previous records: No specific designations; Muttkowski, 1910 ("*Canadian to Lower Austral: Canada to Guatemala*").

Family CÆNAGRIONIDÆ "Brocatels"

Subfamily LESTINÆ "Gimps"

45. *Lestes congener* Hagen, "Common Gimp"—*Churchill County* (Carson Sink); *Elko County* (Carlin, Elko); *Eureka County* (Beowawe, Palisade); *Humboldt County* (Mouth of Little Humboldt River, Winnemucca); *Pershing County* (Lovelock, Mill City, Rye Patch Reservoir); *Washoe County* (Truckee Meadows, Wadsworth). Previous records: Kennedy, 1917 ("*Reno, Lower Truckee River, Carlin, Golconda, Winnemucca*"); Essig, 1926 ("*A common species throughout the United States, and widely distributed in the west*").
46. *Lestes unguiculatus* Hagen, "Pond Gimp"—*Pershing County* (Lovelock, Oreana, Rye Patch Reservoir); *Washoe County* (Dry Lake, Truckee Meadows, Wadsworth). Previous records: Kennedy, 1917 ("*Golconda*").

47. *Lestes uncatus* Kirby, "American Gimp"—*Churchill County* (Rye Patch Reservoir); *Lyon County* (Fernley); *Washoe County* (Dry Lake, Truckee Meadows, Wadsworth). Previous records: Muttkowski, 1910 ("*Canadian and Transition into Upper Austral: Nova Scotia and Panama to California and British Columbia*"); Kennedy, 1917 ("*Reno*").

Subfamily CENAGRIONIDÆ "Willowisps"

48. *Argia agrioides* Calvert, "Desert Wamble"—*Clark County* (Las Vegas, Stump Springs). Previous records: None.
49. *Argia alberta* Kennedy, "Alba Wamble"—*Elko County* (Peck Hot Springs, near Mountain City); *Washoe County* (Steamboat Hot Springs). Previous records: No specific designations; Needham and Heywood, 1929 ("*California, Colorado and Utah*").
50. *Argia rita* Kennedy, "Rita Wamble"—*Clark County* (Las Vegas, Stump Springs). Previous records: None.
51. *Argia emma* Kennedy, "Emma Wamble"—*Churchill County* (Carson Sink); *Elko County* (Carlin, Elko, Mountain City, Owyhee); *Humboldt County* (Winnemucca); *Lander County* (Battle Mountain); *Pershing County* (Rye Patch Reservoir); *Washoe County* (Truckee Meadows, Wadsworth, Washoe Lake). Previous records: Kennedy, 1917 ("*Reno, Lower Truckee River, Carlin, Golconda, Winnemucca*").
52. *Argia vivida* Hagen, "Western Wamble"—*Clark County* (Las Vegas); *Elko County* (Peck Hot Spring near Mountain City). Previous records: No specific designations; Essig, 1926 ("*Common about perennial streams throughout the entire western area, the United States and Canada*"); Needham and Heywood, 1929 ("*British Columbia and Montana to Texas and California*").
53. *Amphiagrion saucium* (Burmeister), "Common Whiffet"—*Elko County* (Elko, Mountain City); *Humboldt County* (Mouth of Little Humboldt River); *Pershing County* (Rye Patch Reservoir); *Washoe County* (Truckee Meadows). Previous records: Muttkowski, 1910 ("*Austral, into Transition: Washington and California to Massachusetts and South Carolina, Cuba?*"); Kennedy, 1917 ("*Reno*").
54. *Telebasis salva* (Hagen), "Desert Alva"—*Clark County* (Stump Springs). Previous records: No specific designations; Essig, 1926 ("*California, Nevada, Arizona*").

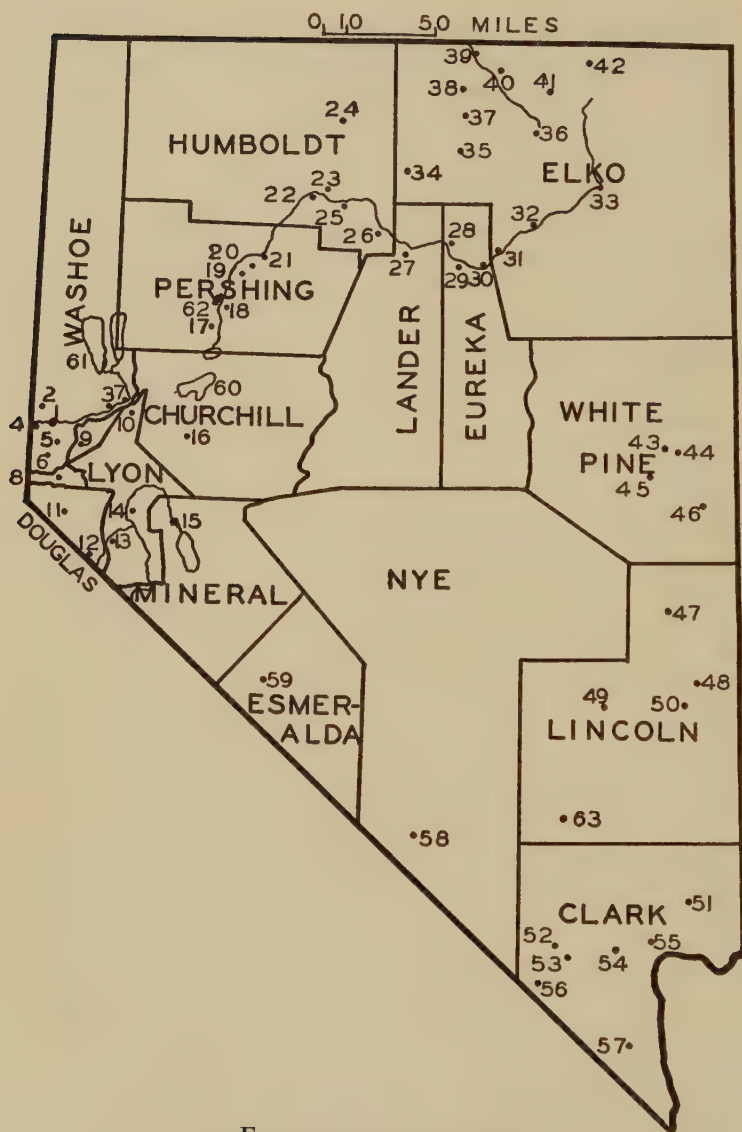
55. *Enallagma boreale* Selys, the "Boreal Bluet"—*Clark County* (Harris Springs, Kyle Canon); *Elko County* (Mountain City); *Washoe County* (Truckee Meadows). Previous records: Muttkowski, 1910 ("*Hudsonian, Boreal and Transition: Alaska and Washington to Nevada to Maine*") ; Kennedy, 1917 ("*Golconda*") as *E. calverti* Morse.
56. *Enallagma clausum* Morse, "Mountain Bluet"—Not seen. Previous records: Morse, 1895 ("*Franktown*") ; Kennedy, 1917 ("*Pyramid Lake, Golconda*").
57. *Enallagma carunculatum* Morse, "Lake Bluet"—*Churchill County* (Carson Sink); *Elko County* (Carlin, Elko); *Humboldt County* (Golconda, Winnemucca); *Pershing County* (Imlay, Lovelock, Rye Patch Reservoir); *Washoe County* (Truckee Meadows, Derby). Previous records: Muttkowski, 1910 ("*Canadian and Alleghanian: British Columbia and Nevada to New York and Pennsylvania*") ; Kennedy, 1917 ("*Lower Truckee River, Pyramid Lake, Carlin, Golconda, Winnemucca, Lovelock*").
58. *Enallagma civile* (Hagen), "Common Bluet"—*Clark County* (Corn Creek, Las Vegas, Stump Springs.) Previous records: No specific designations; Muttkowski, 1910 ("*Transition to Tropics: North America, south of 45° latitude, West Indies*").
59. *Enallagma prævarum* (Hagen), "Western Bluet"—*Clark County* (Rio Colorado, Stump Springs). Previous records: No specific designations; Muttkowski, 1910 ("*Lower Austral: Kansas and Louisiana, west to California, Mexico*") ; Essig, 1926 ("*California, Nevada, Arizona, New Mexico*").
60. *Enallagma anna* Williamson, "Ana Bluet"—*Elko County* (Elko, Mountain City); *Pershing County* (Rye Patch Reservoir); *Washoe County* (Truckee Meadows, Sparks Canon). Previous records: Kennedy, 1917 ("*Reno, Golconda*").
61. *Ischnura denticollis* (Burmeister), the "Little Forktail"—*Elko County* (Carlin, Elko); *Humboldt County* (Mouth of Little Humboldt River, Winnemucca); *Lander County* (Battle Mountain); *Washoe County* (Truckee Meadows, Wadsworth). Previous records: Kennedy, 1917 ("*Golconda, Lovelock*").
62. *Ischnura perparva* Selys, the "Arva Forktail"—*Churchill County* (Carson Sink); *Elko County* (Deep Creek, Gold

- Creek, Mountain City, North Fork, Owyhee, Whiterock); *Humboldt County* (Golconda, Valmy, Winnemucca); *Pershing County* (Rye Patch Reservoir); *Washoe County* (Truckee Meadows, Verdi, Wadsworth). Previous records: Muttkowski, 1910 ("*Upper and Lower Sonoran: Rockies, British Columbia and Montana to California and Texas*") ; Kennedy, 1917 ("*Reno, Carlin, Golconda*").
63. *Ischnura cervula* Selys, the "Ula Forktail"—*Eureka County* (Beowawe); *Humboldt County* (Mouth of Little Humboldt River, Winnemucca); *Pershing County* (Lovelock, Oreana, Rye Patch Reservoir); *Washoe County* (Truckee Meadows). Previous records: Kennedy, 1917 ("*Reno, Lower Truckee River, Pyramid Lake, Carlin, Golconda*").

The following species have not yet been found within the borders of the state but will doubtless be found in the future because they occur in similar adjacent areas: *Gomphoides obscura* (Rambur), *Cordulegaster diadema* Selys, *Somatochlora semicircularis* (Selys), *Pseudoleon superbus* (Hagen), *Libellula luctuosa* Burmeister, *Libellula comanche* Calvert, *Plathemis lydia* (Drury), *Sympetrum obtrusum* (Hagen), *Dythemis velox* Hagen, *Brechmorhoga mendax* (Hagen), *Agrion maculatum* Beauvais, *Lestes disjunctus* Selys, *Hyponeura lugens* (Hagen), *Argia mæsta* (Hagen), and *Enallagma cyathigerum* Charpentier.

BIBLIOGRAPHIC REFERENCES

- Brown, C. J. D., 1934. A Preliminary List of Utah Odonata. Occas. Papers Mus. Zool., Univ. Mich., No. 291.
- Essig, E. O., 1926. Insects of Western North America. The Macmillan Company, pp. 141-150.
- Kennedy, C. H., 1917. Notes on the Life History and Ecology of the Dragonflies (Odonata) of Central California and Nevada. Proc. U. S. N. M., 52:483-635.
- La Rivers, I., 1938. An Annotated List of the Libelluloidea (Odonata) of Southern Nevada. Jour. Ent. & Zool. No. 4/30:73-85.
- Muttkowski, R. A., 1910. Catalogue of the Odonata of North America. Bul. Pub. Mus. City of Milwaukee, 1:1-207.
- Needham, J. G., and Heywood, H. B., 1929. Handbook of the Dragonflies of North America. Charles C. Thomas, Springfield, Ill., pp. viii+378.
- Walker, E. M., 1912. North American Dragonflies of the Genus *Æschna*. Univ. of Toronto Studies, Biol. Series No. 11.
1925. North American Dragonflies of the Genus *Somatochlora*. Univ. of Toronto Studies, Biol. Series.



EXPLANATION OF PLATE

Showing the points at which the author has made collections of dragonflies. The unnamed counties are Ormsby, in which Locality 8 lies, and Storey, designated by Locality 9. The long stream heading in Elko County and winding westward across the state to the Pershing-Churchill boundary is Humboldt River,

the longest stream in Nevada. The Owyhee River, whose source is near that of the Humboldt, flows northwest into Puget Sound. Two other large streams are the Truckee, entering Nevada from the west and depositing its waters in Pyramid and adjacent Winnemucca lakes (Washoe County), and the Walker emptying into Walker Lake in Mineral County. Forming the state's extreme southeast boundary, is the great Rio Colorado, the largest stream touching Nevada. Following is an explanatory list of the collecting localities: (1) Reno (Truckee Meadows), (2) Peavine (Cody Basin, Dry Lake), (3) Derby, (4) Verdi, (5) Steamboat Springs, (6) Franktown (Washoe Valley, Washoe Lake), (7) Wadsworth, (8) Carson City, (9) Virginia City, (10) Fernley, (11) Gardnerville, (12) Topaz Lake, (13) Smith Valley, (14) Yerington, (15) Schurz, (16) Fallon, (17) Lovelock, (18) Oreana, (19) Humboldt, (20) Imlay, (21) Mill City, (22) Winnemucca, (23) Mouth of Little Humboldt River, (24) Paradise, (25) Golconda, (26) Valmy, (27) Battle Mountain, (28) Dunphy, (29) Beowawe, (30) Palisade, (31) Carlin, (32) Elko, (33) Deeth, (34) Midas, (35) Tuscarora, (36) North Fork, (37) Deep Creek, (38) Whiterock, (39) Owyhee, (40) Mountain City, (41) Gold Creek, (42) Jarbridge, (43) Duck Creek, (44) Timber Creek, (45) Ely, (46) Lehman Caves, (47) Pony Spring, (48) Panaca, (49) Pahrnagat Valley (Hiko), (50) Caliente, (51) Overton, (52) Lee Canon, (53) Harris Spring, (54) Las Vegas, (55) Boulder City (Boulder Lake), (56) Stump Springs, (57) Searchlight, (58) Beatty, (59) Fish Lake Valley, (60) Carson Sink, (61) Pyramid Lake, (62) Rye Patch Reservoir, (63) Quartz Spring.

EDWARD PAYSON VAN DUZEE

It is with deepest regret that we announce the death of Mr. Edward Payson Van Duzee at the age of 79 years. Born in New York City on April 6, 1861, he died on June 2, 1940, at Alameda, California, after a brief illness.

As a fitting memorial to one who served so long and so faithfully, the Publication Committee of the Pan-Pacific Entomologist dedicates the October number of the journal to Mr. Van Duzee, one of the founders and editor during the first fourteen years of its existence. The October number will contain a full account of the life and work of Mr. Van Duzee.—R. L. Usinger.

A NEW SPECIES OF CALLIGASTER FROM THE
PHILIPPINE ISLANDS

(Hymenoptera, Vespidae, Subfam. Zethinae)

BY J. BEQUAERT

Museum of Comparative Zoölogy, Cambridge, Massachusetts

I have known for some time that the large Zethine wasp from the Philippines, listed thus far as *Calligaster cyanopterus*, is structurally distinct from the true Javanese *cyanopterus*. I intended to describe it in a revision of Philippine Diploptera. As this revision may be indefinitely postponed, the *Calligaster* is now described by itself.

Calligaster williamsi Bequaert, new species

Zethus (*Calligaster*) *cyanopterus* F. X. Williams, 1919, Rept. Expt. Sta. Hawaiian Sugar Planters' Assoc., Ent. Ser., Bull. 14, p. 157, figs. 88 (male), 89-94 (nest, egg, pupa). Not of de Saussure, 1852.

Length (h. + th. + t.1 + 2): female, 21 to 26 mm.; male, 20 to 22 mm.; of fore wing: female, 20 to 21 mm.; male, 20 mm.

Female. Head in front view (Fig. 1A) more nearly circular than in *cyanopterus*, conspicuously swollen at vertex and in upper outer orbits. First abdominal segment shaped much as in *cyanopterus*, but the ribbon-like portion of tergite (Fig. 1B) relatively wider and less parallel-sided, more flattened above and somewhat concave basally; first sternite also relatively wider. Punctuation much finer and very sparse on frons, vertex and outer orbits (in *cyanopterus* the punctures of these areas are larger than their intervals); also smaller and farther apart along hind margin of pronotum, over mesonotum and scutellum and in lower part of mesopleura. Longitudinal striation of median area of first tergite sharper and more regular than in *cyanopterus*, spreading fan-like; at base there are seven to ten fine ridges on either side of a conspicuous median ridge; as some of the ridges stop at the margin, new ones appear in the intervals of the remaining; grooves between ridges smooth (punctate in *cyanopterus*). Mid tibiae with two apical spurs (as in *cyanopterus*). Color of body and wings as in *cyanopterus*, but the clypeus and mandibles entirely black (in the two females of *cyanopterus* seen, the apical area of the clypeus and portions of the mandibles are ferruginous).

Male. Differs from *cyanopterus* in the same details of structure and sculpture as the female. Head (Fig. 1C) not conspicuously swollen; apical margin of clypeus more deeply emarginate than in *cyanopterus*. Thirteenth antennal segment (Fig. 1D)

shorter and more broadly rounded off. Clypeus and frons entirely black (in the two males of *cyanopterus* seen the clypeus bears a small dirty-yellow spot below the middle and there are two dirty-yellow dots on the inter-antennal transverse ridge).

C. williamsi seems to average larger than *C. cyanopterus*.

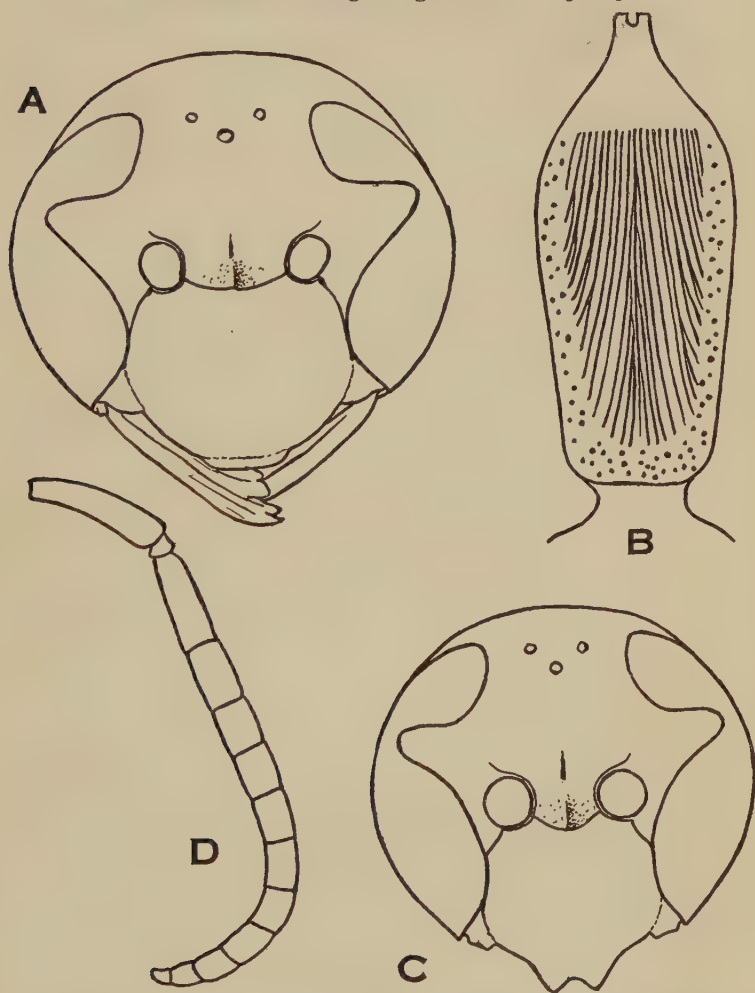


Fig. 1. *Calligaster williamsi* J. Bequaert: A, head of female; B, first abdominal tergite of female; C, head of male; D, antenna of male.

Holotype, female, and *allotype*, male, Los Baños, Luzon, Philippine Is. (F. X. Williams), Mus. Comp. Zoöl., Cambridge, Mass.

Numerous *paratypes* of both sexes at the Philippine Bureau of Science, the Dept. of Entomology of the College of Agriculture at Laguna, P. I., the American Museum of Natural History, the U. S. National Museum, the Academy of Natural Sciences, Philadelphia, and in Mr. J. van der Vecht's collection, from Los Baños, Luzon (D. Maulit; P. Bautista; M. M. Manis; A. Coronel; Pedroso; D. Feria, etc.); Zambales, Amuling, Luzon (R. C. McGregor); Mt. Maquiling, Luzon (A. Durano); Bayombong, Luzon; Lamao, Bataan, Luzon (H. M. Curran); Montalban Gorge, Rizal, Luzon (W. Schulze); and Puerta Galera, Mindoro (R. P. Cowles).

C. williamsi should not be confused with a species of *Pareumenes*, of the Philippines (apparently undescribed), of the same color and much the same shape, having even the median longitudinal striation of the first tergite. The *Pareumenes*, however, has long, knife-like mandibles and a quadridentate propodeum.

Calligaster de Saussure differs from *Zethus* in the shape of the first abdominal segment, the tergite of which bears a median dorsal area covered with longitudinal striæ. The mid tibiæ have two apical spurs in all species I have seen. In the male the antennæ have thirteen segments, but the thirteenth is normal, straight, not bent back as a hook nor curled up. The genus is strictly Indo-Malayan. *C. cyanopterus* de Saussure (1852) is probably restricted to Java, *Zethus erythrostomus* "Cameron" Meade Waldo (1914) and *Calligaster javanus* Gribodo (1891) being synonyms; its nest and habits were described by H. O. Forbes (1885, *A Naturalist's Wanderings in the Eastern Archipelago*, pp. 72-73), G. E. Frisby (1919) and J. van der Vecht (1934). The supposed *cyanopterus* recorded from Celebes, by F. Smith (1858), and from Sumatra, by Gribodo (1891), were certainly different and probably undescribed species. *C. williamsi* is restricted to the Philippines, where its habits were investigated by F. X. Williams (1919). *Zethus himalayensis* Cameron (1904), of Sikkim, and *Zethus etchellsii* Cameron (1909), of Borneo, the types of which I have seen at the British Museum, appear to be true *Calligaster*. Both are specifically distinct from either *cyanopterus* or *williamsi*. None of the other described Indo-Malayan *Zethinæ* belong in *Calligaster*.

The type of *Calligaster* is *Calligaster cyanopterus* de Saussure, by designation of Ashmead (1902, *Can. Ent.*, 24:205).

TWO NEW SPECIES OF LOMACHÆTA, WITH A KEY TO DESCRIBED SPECIES*

(Hymenoptera, Mutillidæ)

BY CLARENCE E. MICKEL

University of Minnesota

Mr. George E. Bohart, Davis, California, has sent me three specimens, representing both sexes, of a small Mutillid which he states were reared from Larrid cocoons. They proved to be an undescribed species of the genus *Lomachæta*. Mr. Rollin H. Baker, Austin, Texas, has sent me an additional male specimen of the same genus collected in northern Mexico. It represents a second undescribed species.

The genus *Lomachæta* was proposed by the author (Ann. Ent. Soc. Amer., vol. 29, pp. 289-295, 1936). The two new species bring the total number of known species to six. A key to the species is herewith presented to facilitate their identification. The few observations regarding biology which are available indicate that the species of this genus are parasites of small aculeate Hymenoptera which nest in the twigs of plants.

KEY TO THE SPECIES OF LOMACHÆTA

Males

1. Body almost entirely, or entirely black.....2
- At least the abdomen in part ferruginous.....3
2. Pronotum with moderate, close punctures throughout; distal margin of second abdominal tergite obscurely testaceous.....*punctinota* Mickel
- Pronotum with moderately small punctures, the latter sparse medially, close at the lateral margins; abdomen entirely black.....*coloradensis* Mickel
3. Abdomen almost entirely ferruginous; abdominal tergites three to six each with an anterior, median, black spot; most of the area of each black spot on that part of the tergite telescoped within the preceding segment; trochanters and femora of middle and posterior legs ferruginous, except the tips of the femora blackish.....*hicksi* Mickel
- Only the first and second abdominal segments marked with ferruginous; legs entirely black.....4
4. First tergite, and second abdominal segment entirely ferruginous; head and thorax entirely, and abdomen, except marginal bristles on tergites two to four, and sparse, dark hairs medially on tergites five to seven, clothed with sparse, pale hairs.....*formosula* n. sp.

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- First and second abdominal segments ferruginous only in part; the median, longitudinal third of the second tergite black, the black area dilated toward the posterior margin, and slightly constricted at the anterior margin; first sternite mostly black, ferruginous only at the sides; second sternite with a median, anterior, cuneiform, infuscated spot; front, vertex, mesonotum, scutellum, black area of second tergite and tergites three to seven with sparse black pubescence.....*variegata* n. sp.

Females

1. Entirely pale ferruginous, except the antennæ, tibiæ and tarsi infuscated; dorsum of thorax very broadly reticulate throughout.....*hicksi* Mickel
- At least the second abdominal tergite largely black, and the ferruginous of the head and dorsum of thorax infuscated; at least the anterior third to half of dorsum of thorax narrowly reticulate, the remainder broadly reticulate.....2
2. All of the abdominal segments, except the first, piceous to black, the posterior margin of each tergite and sternite ferruginous; tibiæ and tarsi piceous.....*variegata* n. sp.
- Abdomen entirely ferruginous, except the second black with the broad, posterior margin ferruginous; legs entirely ferruginous.....*minutula* Mickel

Lomachæta variegata Mickel, new species

Male. Black, except the first and second abdominal segments in part ferruginous as described below, clothed with sparse, pale, glittering pubescence, except the front, vertex, mesonotum, scutellum, median black area of second tergite, and tergites three to seven with sparse, black pubescence, the abdominal tergites also with a few, pale, erect hairs at each lateral margin; pronotum with moderate, close punctures throughout; first segment of flagellum shorter than pedicel, about half the length of second flagellar segment. Length, 5.5 mm.

Head entirely black, clothed with sparse, pale, glittering pubescence, except front and vertex with sparse, black pubescence, and clypeus with long, thick pubescence pale in certain lights, fuscous in others; mandibles tridentate at tip and broadly emarginate beneath; clypeus convex medially, the sculpture obscured by thick pubescence; antennal tubercles separated by a space equal to length of second flagellar segment; scape densely punctate, clothed with black pubescence; first segment of flagellum as described above; front subreticulate, the punctures large and crowded, but becoming slightly smaller and less crowded toward vertex, the latter with moderate, slightly separated punctures; ocelli very small; relative widths of head and thorax at tegulæ, 2.0-2.2. *Thorax* entirely black, clothed with sparse, pale, glittering pubescence, except mesonotum and scutellum with sparse,

black pubescence; pronotum and mesonotum with moderate, distinct, close punctures throughout; scutellum with moderate, distinct punctures anteriorly, small, distinct punctures at posterior margin; dorsum of propodeum without an enclosed space, both dorsum and posterior face of propodeum reticulate throughout; propleura closely punctate; mesopleura with large, contiguous punctures medially, the anterior and posterior fourths glabrous, almost impunctate; metapleura and sides of propodeum glabrous, unsculptured, except reticulation of dorsum and posterior face of propodeum extending slightly on to sides of propodeum; tegulae convex, glabrous, impunctate, except entire, narrow margin punctate and pubescent. *Abdomen* black, except as follows: first tergite ferruginous, except anterior margin black; second tergite with lateral thirds ferruginous, median third black, the lateral margins of black area slightly sinuate, dilated toward posterior margin and slightly constricted at anterior margin; lateral margins of first sternite ferruginous; second sternite ferruginous, except a large anterior, cunieforn spot blackish; abdomen clothed with sparse, pale, glittering pubescence, except median black area of second tergite and tergites three to seven with sparse, black pubescence; bristles at posterior margin of second, third and fourth segments black; first tergite mostly impunctate, with a submarginal row of large, contiguous punctures near posterior margin; second tergite with moderate, well separated punctures; tergites three to seven with fine, separated punctures; first sternite with a median, longitudinal carina; second sternite with moderately large, distinct, close punctures; sternites three to six finely punctate at posterior margin; hypopygium with very small, distinct punctures. *Wings* subhyaline; venation typical, as figured previously for *hicksi*. *Legs* black, clothed with sparse, pale, glittering pubescence; tibiae externally with very sparse, erect, black bristles; calcaria pale.

Female. Ferruginous, except front, vertex and dorsum of thorax infuscated; abdomen, except first segment and posterior margin of remaining segments, piceous; and femora, tibiae and tarsi, infuscated to black; front, vertex and anterior half of dorsum of thorax narrowly reticulate, the posterior half broadly reticulate; abdominal tergites shagreened, and with small, scattered punctures, the second tergite with a thick, posterior fringe of pale pubescence, third tergite with a similar, thinner fringe; pygidial area obsolete. Length, 3 mm.

Head ferruginous, except front and vertex infuscated and flagellum black, clothed with very sparse, erect, black hairs, except the genae and clypeus with pale pubescence; mandibles edentate, not emarginate nor toothed beneath; antennal tubercles slightly separated; pedicel and first flagellar segment equal in length, the latter longer than second, but shorter than second and third united; antennal scrobes not carinate above; front, vertex and genae reticulate, the posterior margin of genae defined by a

carina. *Thorax* ferruginous, infuscated like head, the dorsum clothed with scattered, recumbent, pale hairs, and very sparse, erect, fuscous hairs; pleural areas bare, except a few, scattered, pale hairs on propleura and mesopleura; anterior half of dorsum of thorax narrowly reticulate, the posterior half broadly reticulate; dorsum of propodeum and lateral margins of posterior face of propodeum also broadly reticulate, but median, posterior area of posterior face of propodeum unsculptured, glabrous; relative widths of thorax at humeral angles, anterior spiracular tubercles, propodeal spiracles and posterior margin of propodeum, 1.2 — 1.4 — 1.3 — 0.3; propodeal spiracular tubercles prominent; scutellar scale entirely absent; propleura and posterior half of mesopleura reticulate; anterior half of mesopleura, metapleura entirely, and sides of propodeum glabrous, unsculptured. *Abdomen* piceous, except first segment ferruginous, and posterior margins of tergites and sternites two to five, ferruginous, clothed with sparse, pale hairs beneath and on first tergite above, the remaining tergites with scattered, erect, fuscous hairs, second tergite also with a thick, posterior marginal fringe of pale pubescence, and third tergite with a similar fringe, but pubescence thin; first tergite with a few, scattered punctures, and a posterior, submarginal row of moderate, distinct punctures; second and following tergites shagreened, and with scattered, small punctures; pygidial area obsolete; first sternite with a median, longitudinal carina; second sternite with moderate, distinct punctures; sternites three to five indistinctly, finely punctate at posterior margin. *Legs* ferruginous, the tibiae and tarsi piceous, clothed with sparse, pale, glittering pubescence; calcaria pale.

Holotype, allotype and paratype, a male and two females, Riverside County, California, May 2, 1939, reared from Larrid cocoon in twig (R. M. Bohart). Holotype and allotype in the California Academy of Sciences collection; paratype in University of Minnesota collection.

The three type specimens each bear a label reading "ex Crabronid," but Mr. George E. Bohart has stated in a letter to me that the cocoons from which the specimens were reared are actually Larrid cocoons.

Lomachæta formosula Mickel, new species

Male. Black, except first abdominal tergite, second abdominal segment entirely, and tips of mandibles, ferruginous, clothed throughout with sparse, erect, pale hairs, except tergites five to seven medially with sparse, erect, dark hairs, and bristles at posterior margin of tergites two to four, black; pronotum with moderately large, irregularly spaced punctures, some well separated, some confluent; first segment of flagellum shorter than

pedicel, about half the length of second flagellar segment. Length, 5 mm.

Head entirely black, except tips of mandibles ferruginous, clothed throughout with sparse, long, erect, pale hairs, except a few fuscous hairs at inner eye margins; mandibles tridentate at tip, distinctly emarginate beneath, and with a distinct tooth beneath, half the distance from base to apex; median area of clypeus triangular, slightly elevated, densely, finely punctate throughout; antennal tubercles separated by a space equal to length of second flagellar segment; scape clothed with pale hairs throughout; front subreticulate, the punctures large and crowded; vertex with moderately large, distinct, separated punctures; ocelli very small; relative widths of head and thorax at tegulæ, 1.3—1.6. *Thorax* entirely black, clothed throughout with sparse, long, erect, pale hairs; pronotum with moderately large, irregularly spaced punctures, some well separated, some confluent; mesonotum with moderately large, close punctures throughout; scutellum almost flat, only very slightly convex, with punctures similar to mesonotum but more crowded; dorsum of propodeum without an enclosed space; both dorsum and posterior face of propodeum broadly reticulate throughout; propleura mostly smooth, glabrous, very few punctures; anterior and posterior fourths of mesopleura glabrous, impunctate, the median half with large, contiguous punctures, subreticulate; metapleura and sides of propodeum glabrous, impunctate, the dorsal margin of metapleura finely rugose, and reticulations of dorsum and posterior face of propodeum extending slightly on to sides of propodeum; tegulæ large, strongly convex, glabrous, impunctate, except entire margin punctate and with long, pale, erect hairs. *Abdomen* black, except first tergite, and second segment entirely, ferruginous, clothed throughout with sparse, long, erect, pale hairs, except tergites five to seven medially with hairs dark, and bristles at posterior margin of tergites two to four, black; first tergite almost impunctate, but posterior margin with a row of very large, contiguous punctures; second tergite with moderately large, distinct, slightly separated punctures; tergites three to seven with progressively small to fine, separated punctures; second sternite with large, close punctures throughout. *Wings* subhyaline; venation typical, as previously figured for *hicksi*. *Legs* black, clothed with sparse, long, erect, pale hairs; tibiæ without black bristles; calcaria pale.

Holotype, male, Puerta de la Goriona, elevation 4900 feet, Sierra del Carmen, Coahuila, Mexico, July 13, 1938 (Rollin H. Baker), in University of Minnesota collection. (Mr. Baker writes that "Sierra del Carmen" on the label should read "Sierra de la Encantada.")

Similar to *variegata* but with the second abdominal segment entirely ferruginous and clothed almost entirely with long, erect, pale hairs.

THE IDENTIFICATION OF THE FEMALE OF THE
MYRMOSID SUBGENUS MYRMOSULA*

(Hymenoptera, Tiphidae)

BY CLARENCE E. MICKEL

University of Minnesota

A revision of the Myrmosinæ of the New World by Dr. Karl V. Krombein has recently appeared (Trans. Amer. Ent. Soc., vol. 65, pp. 415-465, January 23, 1940). It includes a key to the males and females of the subgenus *Myrmosula* and a description of the new species *Myrmosa* (*Myrmosula*) *exaggerata*. Since the appearance of this revision, two female specimens of *Myrmosula* have come to my notice by being included with Mutillid material sent me for identification. The first specimen was sent me for identification by the Division of Entomology, University of California, Berkeley, California. An attempt was made to identify the specimen by means of Krombein's key but due to the use of an unfortunate descriptive term and the absence of any mention of certain structures on the head, authentic identification could not be made. The specimen had been collected at Pasadena, California, and since the only other species recorded from that vicinity was the unique type of *exaggerata* from Riverside, California, it seemed probable that the specimen was one of that species. The description of *exaggerata* states: "Frontal processes joined basally to form a weak median biramose process overhanging the bases of the antennæ." The front of the specimen in question was strongly elevated between the insertion of the antennæ and the elevation bore a pair of parallel ridges separated by a distance much less than the length of the ridges. It did not seem possible to imagine this elevated prominence as being a biramose process. The same phrase, biramose process, was used in Krombein's key to describe the interantennal elevation in the species *rutilans*, except that in that species the biramose process was said to be strong. An examination of *rutilans* specimens determined by Krombein showed that the interantennal elevation bore a pair of strong oblique ridges, converging but not meeting posteriorly. There was almost no resemblance between the interantennal elevations of the two species, except that both had a pair of ridges, and it did not seem possible to use such a descriptive term as "biramose" in describing either one.

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The Pasadena specimen also had a pair of processes on the under side of the head near the insertion of the mandibles. Nothing whatever was said in the original description of *exaggerata* regarding such processes.

The specimen was sent to Professor P. H. Timberlake, University of California Citrus Experiment Station, Riverside, California, for comparison with the type. Special attention was called to the form of the interantennal elevation and the processes on the under side of the head. Professor Timberlake replied that the type and the Pasadena specimen were exactly alike in all respects, except for a slight difference in color, which he did not regard as significant.

A second specimen came in material from the California Academy of Sciences. It was collected at Antioch in Contra Costa County, California. While it is closely related to *exaggerata* it is obviously not the same and is described hereafter.

All of the species of *Myrmosula* have a well developed hypostomal carina. This carina is more or less elevated into a tubercle or a strong process slightly mesad of the insertion of the mandible in all the females of this subgenus so far described. This modification of the hypostomal carina has not been mentioned with reference to any species in any of the previous papers on this group. The following key is offered with the hope that it may aid in the easier and more certain identification of the known females:

1. Front not elevated between the insertions of the antennæ, the antennal tubercles large and prominent; hypostomal carina elevated slightly mesad of insertion of mandibles into a distinct tooth, the latter almost concealed by the mandibular lamella; inferior margin of mandibular lamella emarginate *parvula* Fox
- Front very strongly elevated between the antennæ, the antennal tubercles much less prominent than the interantennal elevation; hypostomal carina very slightly tuberculate slightly mesad of the insertion of mandibles, or with a process not concealed by the mandibular lamella; inferior margin of mandibular lamella emarginate or not.....2
2. Interantennal elevation with a pair of weak parallel ridges; hypostomal carina elevated into a distinct, dentate process slightly mesad of the insertion of mandibles, the tip of the process blunt and slightly recurved anteriorly.....3
- Intertennal elevation with a pair of oblique, prominent ridges converging posteriorly; hypostomal carina with only a very

small tubercle slightly mesad of the insertion of the mandibles

-*rutilans* (Blake)
3. Parallel ridges on interantennal elevation approximate, the distance between them equal to half their length; front without a depression immediately behind the interantennal elevation; inferior edge of mandibular lamella broadly, shallowly emarginate.....*exaggerata* Krombein
 4. Parallel ridges on interantennal elevation widely separated, the distance between them almost equal to their length; front with a distinct depression immediately behind the interantennal elevation; mandibular lamella short, its inferior edge not emarginate.....*pacifica* n. sp.

***Myrmosa* (*Myrmosula*) *pacifica* Mickel, new species**

Female. Pale, ferruginous, almost testaceous throughout, except for darkened tips of mandibles; second tergite with a pair of small, creamy white, antero-lateral spots; and median third of telescoped part of last tergite, creamy white. *Head* distinctly broader than thorax; the front and vertex with small, close, distinct punctures, the genæ with fine, close punctures; mandibles bidentate at tip, the mandibular lamella on inferior margin short, present only on proximal third of mandible, and not emarginate; hypostomal carina produced slightly mesad of insertion of mandibles forming a blunt process distinctly recurved anteriorly at tip, and distinctly visible below mandibular lamella; anterior margin of clypeus broadly, shallowly emarginate; front strongly elevated between insertions of antennæ, the elevation bearing a pair of widely separated, parallel ridges, the distance between the ridges almost, but not quite, equal to their length; a very shallow, broad depression immediately posterior to interantennal elevation; head clothed throughout with very short, pale, glittering hairs, and scattered, long, erect hairs. *Dorsum of thorax* finely, very closely punctate, the pleural areas weakly striolate-punctate; thorax clothed throughout with very short, pale, glittering hairs and numerous, long, erect, pale hairs. *Abdomen* weakly, finely punctate, clothed with very short, pale, glittering hairs and scattered, long, erect hairs, except exposed portion of last tergite with thick, long, very pale ferruginous hairs. *Legs* finely, closely punctate, clothed throughout with thick, short, appressed, pale, glittering hairs and a few scattered long, erect pale hairs. Length, 4.5 mm.

Holotype, female, Antioch, California, September 4, 1938 (E. C. Van Dyke), in the California Academy of Sciences.

MYRMOSA (*MYRMOSULA*) *EXAGGERATA* Krombein

A single female has been examined from Pasadena, California, May 22, 1925; compared with the type by P. H. Timberlake.

THE CALIFORNIA SPECIES OF THE GENUS TRAGIDION (Coleoptera, Cerambycidae)

BY E. GORTON LINSLEY

University of California

The genus *Tragidion* is composed of large, striking, handsome longicorns, most of the species of which are rare in collections. Three species and one subspecies are known to occur in California, but apparently all but one of these have been misidentified. The following key is offered in an attempt to straighten out these forms.

KEY TO THE SPECIES AND SUBSPECIES OF TRAGIDION OCCURRING IN CALIFORNIA

1. Elytra smooth, not corrugated, costæ indicated by vague, thread-like, unraised lines; posterior tibiæ slender, sparsely pubescent; dark pubescence without bluish reflections.....2
- Elytra corrugated, costæ strongly elevated; posterior tibiæ robust, densely pubescent; dark pubescence with a distinct bluish reflection.....(*peninsulare*).....3
2. Posterior tarsi densely pubescent beneath, segments broad, first shorter than two following together, second wider than long, distinctly shorter than third segment; antennæ distinctly less than twice as long as body in male. 17–20 mm. Mojave Desert. Host: *Yucca*.....*armatum*
- Posterior tarsi sparsely pubescent beneath, segments narrow, first longer than two following together, second longer than wide, distinctly longer than third segment; antennæ twice as long as body in male. 20–22 mm. Central and northern California. Host: *Rhamnus*.....*gracilipes*
3. Posterior tarsi broad, first segment gradually expanded to apex, about twice as long as apical width; larger: 28–34 mm. Southern and Lower California. Host: *Prosopis*.....*peninsulare peninsulare*
- Posterior tarsi narrow, first segment parallel-sided, nearly three times as long as apical width; smaller: 17–21 mm. Central and northern California. Host: *Quercus*.....*peninsulare californicum*

(1) TRAGIDION ARMATUM LeConte

Tragidion armatum LeConte, 1858, Jour. Acad. Nat. Sci. Phila., (2) 4:25; Lacordaire, 1869, Genera Coleopt., 9:174, f.n.3; LeConte, 1873, Smithson. Misc. Coll., XI, 265:314; LeConte and Horn, 1883, Smithson. Misc. Coll., XXVI, 507:299; Leng, 1886, Entom. Amer., 2:81; Casey, 1893, Ann. N. Y. Acad. Sci., 7:586; Hamilton, 1896, Trans. Amer. Ent. Soc., 23:169; Casey, 1912,

Mem. Coleopt., 3:324; Craighead, 1923, Can. Dept. Agr., Bull. 27:79, pl. 27, f.3 (larva).

In this species the antennæ are usually but little longer than the body in the male and about three-fourths as long as the body in the female but a small percentage of individuals in any moderate series show variation in this character. The most constant structures appear to be the smooth elytra and the form of the posterior tarsi.

Type locality: Upper Rio Grande Valley, New Mexico.

Distribution: Western Texas to Mojave Desert, California.

Host: *Yucca*.

(2) *Tragidion gracilipes* Linsley, new species

Form elongate, subcylindrical; color black, elytra reddish orange, antennal segments three to six reddish in both sexes, pubescence black. *Head* opaque, finely, closely punctured, the punctures perceptibly larger on vertex; vertical carina distinct, shining; vertical horns of male prominent; pubescence short, erect, moderately dense; antennæ twice as long as body in male, attaining apical one-fourth of elytra in female. *Pronotum* of male opaque, densely pubescent, with anterior disk very coarsely, more or less contiguously punctured, discal tubercles shining, finely, sparsely punctured, punctures of posterior disk fine, close; pronotum of female very finely, closely but not contiguously punctured, median callous large, polished, with a few fine punctures around margin, discal tubercles polished, with a few coarse punctures; prosternum coarsely, subcontiguously punctured in male, finely, closely in female; metasternum and metepisterna finely punctured and pubescent in both sexes; scutellum clothed with black pubescence. *Elytra* about one and eight-tenths times as long as broad; smooth, costæ thread-like, not elevated; surface finely, closely punctured, densely clothed with short, depressed, golden reddish hairs intermixed with fine black hairs on basal margin; apices narrowly, conjointly rounded. *Legs* elongate; posterior tibiæ slender; posterior tarsi sparsely pubescent beneath, segments narrow, first segment longer than following two together, second segment longer than broad, distinctly longer than third segment. *Abdomen* without an apical golden fringe in either sex; sternites opaque, finely, closely punctured and pubescent. Length 20 mm.; breadth, 5.5 mm.

Holotype, male (No. 4603, Calif. Acad. Sci., Ent.), and allotype, female (No. 4604), from Napa County, California, June 18, 1922, on *Rhamnus californica*, collected by Mr. E. R. Leach. Numerous paratypes with the same data are in the collections of Mr. E. R. Leach and the writer. Additional paratypes are as follows: One female, Havilah, California, June 19, 1905, F.

Grinnell (Van Dyke collection, C. A. S.), and one male, Willow Spring, Kern County, California, June 30, 1905, F. Grinnell (Van Dyke collection, C. A. S.).

This fine species is related to *T. armatum* LeConte but differs in the very long antennæ of the male (twice as long as the body) and the form of the tarsi in both sexes (sparsely padded beneath with narrow segments, the first longer than the following two together, the second longer than broad and distinctly longer than third). In addition it has an entirely different distribution (foothills rather than desert) and host (*Rhamnus* rather than *Yucca*).

(3) TRAGIDION PENINSULARE Schæffer

Tragidion annulatum, Casey, 1893, Ann. N. Y. Acad. Sci., 7:856; Hamilton, 1896, Trans. Amer. Ent. Soc. 23:169.

Tragidion annulatum var. *peninsulare* Schæffer, 1908, Bull. Brooklyn Inst. Arts Sci., 1:339.

Tragidion peninsulare, Casey, 1912, Mem. Coleopt., 3:321.

This species differs from *T. annulatum* LeConte (type locality: Sonora, México) by having a narrow dark band at the base of the elytra. The male further differs in having segments eight to eleven of the antennæ black, the head, thorax, and legs black rather than reddish brown, and the elytra reddish orange rather than fulvous. A few specimens of what appears to be typical *peninsulare* have been seen from the deserts of southern California, on *Prosopis*.

The majority of the California forms are smaller, differ in general as indicated in the key, and although occurring from San Diego to Shasta County, are primarily found in the foothills and mountains of the northern part of the state on *Quercus*. These may be regarded as a subspecies, *Tragidion peninsulare californicum* Linsley, new subspecies. Holotype, female (No. 4605, Calif. Acad. Sci., Ent.), and allotype, male (No. 4606). Additional material has been seen from the following localities: Upper Soda Springs, Shasta County (Van Dyke), Mokelumne Hill, Calaveras County (Blaisdell), Yosemite Valley (Linsley), Sequoia National Park, Tulare County (F. T. Scott), San Bernardino Mountains (Linsley), Pasadena (Fenyès), Los Angeles (Linsley), and Poway, San Diego County (Blaisdell). The dates are from June to September. Apparently this is the form which appears in the California lists under the name of "*annulatum* LeConte."

THE GENUS *CENTRIS* IN CALIFORNIA (Hymenoptera, Apoidea)

BY P. H. TIMBERLAKE

University of California Citrus Experiment Station, Riverside

The Californian species of *Centris* are *C. rhodopus* Ckll., *C. rhodoleuca* Ckll., *C. pallida* Fox, *C. hoffmanseggiae* Ckll., *C. tiburonensis* Ckll., *C. cockerelli* Fox, and the two new species described below. *Centris rhodopus* is common during the summer on the deserts of southern California, and I have collected a few in Bear Valley (7000 feet), San Bernardino Mountains. One female has been taken at Riverside, but it must have been a stray or wind-blown specimen, as the species almost surely does not nest in the cismontane area. Of *Centris rhodoleuca* I took three males in Morongo Valley, on *Croton californica*, August 4, 1933. *Centris pallida* is common in the spring and early summer on the Colorado desert and near Needles, at flowers of *Cercidium*, *Olneya* and *Dalea*. It has also been taken by C. M. Dammers in the upper portion of Cajon Canyon. *Centris hoffmanseggiae* occurs on the western part of the Mohave desert and locally in different parts of the cismontane area of southern California. I have taken it at flowers of *Lotus scoparius*, collecting pollen, near Perris. The male has been taken at The Gavilan, Lytle Creek wash and on the Mohave desert near Victorville, on flowers of *Pentstemon antirrhinoides*, *Dicentra chrysantha* and *Larrea divaricata*. Cockerell based his *C. hoffmanseggiae davidsoni* on a male from Banning, which is like the males recorded above, but it seems to me that the subspecies is based on too feeble characters. *Centris tiburonensis* is very similar to *C. pallida*, but smaller. I took both sexes flying with *pallida* at flowers of *Dalea spinosa* near Needles, on June 5, 1938. *Centris cockerelli* occurs rather commonly on the Colorado desert in the spring and early summer at flowers of *Cercidium*, *Krameria* and of several species of *Dalea*. It is certainly the same species as the *C. lanosa* of New Mexico and southern California (Fox and Cockerell records), but the male does not quite agree with Cresson's description of the male from Texas. It is, however, probably not more than subspecifically different from *C. lanosa* Cress.

The types of the following two species are in the collection of the Citrus Experiment Station, Riverside.

Centris californica Timberlake, new species

Nearest *C. hoffmanseggiae* Ckll., but differs in the dentition of mandibles, lack of a yellow spot on clypeus and labrum, and in having the pubescence of abdomen shorter and much appressed, as well as partially dark on the second tergite.

Female. Black. Mandibles red at middle. Legs rufescent, sometimes weakly so, except small joints of tarsi. First two segments of abdomen sometimes rufescent. Antennæ at most slightly rufescent. Tegulae testaceous. Wings dusky hyaline, the nervures blackish. Pygidium rather dark red. Pubescence of head and thorax pale ochraceous, becoming fuscous on the sternum, and of the usual density and texture. Hair of legs black, or blackish, the scopa of hind tibiae and basitarsi dense as usual. Hair on under side of front basitarsi dark reddish. Pubescence of abdomen short, closely appressed, especially on tergites 2 and 3, longer and erect at base of tergite 1, and with longer erect hairs interspersed on 4 and 5. Hair of tergite 1 entirely pale ochraceous. That of tergite 2 more or less dusky or black on disk, but pale at base and sides and pale for a short distance at apex except more or less broadly in middle. Hair of abdomen, including venter, otherwise black. Head broader than long, the face nearly as wide as length of eyes. Mandibles somewhat broadened toward apex. The inner margin crenulate subapically, thus faintly marking off two short, bluntly rounded, teeth. (In *C. hoffmanseggiae* the inner margin of mandible similar except that just basad is a third well-developed subacute tooth). Third antennal joint subequal to four following joints combined. Head shining. Clypeus weakly convex, finely and rather closely punctured at sides, broadly impunctate in middle. Frons and vertex finely, closely punctured, except a small area in front of ocelli and area between ocelli and eyes, impunctate. Thorax, especially mesonotum, more coarsely punctured than frons and dullish, except scutum posteriorly and disk of scutellum. Basal area of propodeum not enclosed, slightly dullish, minutely punctured and thinly hairy. Abdomen above shining, with fine, almost dense, setigerous punctures. Length, 14-15 mm.; anterior wing, 10-11 mm.

Holotype, female, collected at Kerman, Fresno County, California, on mustard, September 24, 1933 (P. A. Harvey). One female (paratype) at flowers of *Cleomella obtusifolia*, Barstow, San Bernardino County, September 12, 1924 (Timberlake).

Centris rhodomelas Timberlake, new species

Differs from all other species in the color of the hair, which is dark red on the notum, otherwise almost entirely black in the female. There seems to be no similar species with which it could be confused.

Female. Shining black. Mandibles with a red blotch on apical tooth. Flagellum rufescent beneath. Tegulae dark ferruginous. Apical joint of tarsi dark red. Wings pale fuliginous, subhyaline, the nervures black. Pubescence dark fox-red on mesoscutum, scutellum and metanotum, and black on head, under parts of thorax, including pleura and propodeum, and on legs and abdomen. Hair of tubercles reddish, tipped with black. Hair on under side of front tarsi and on anterior edge of under side of middle tarsi dark red. Hair of first tergite dusky reddish, appearing either dark or rather light at different angles of vision. Pubescence of the usual density and texture on head, thorax and legs. Pubescence of abdomen thin and appressed, the surface of tergites being well exposed. Hair on tergite 2 shortest, that on following segments longer and less appressed. Hair at base of tergite 1 rather long and erect, but that on the disk appressed. Head wider than long, the width of face subequal to length of eyes. Inner margin of mandibles with three large subacute teeth, the apical tooth much longer and also subacute. On outer surface of mandibles opposite the basal inner tooth is a pencil of dark reddish hair, and the inferior margin has a thin fringe of long hairs of similar color. Third antennal joint subequal to four following joints combined. Clypeus strongly convex, finely and sparsely punctured, with a broad impunctate area in the middle. Frons and vertex more finely and closely punctured. Thorax closely and finely punctured, the notum shining, the pleura tessellate and dull. Basal area of propodeum, except apex, tessellate, slightly dullish, finely punctured and thinly hairy. Tergites shining, with minute setigerous punctures. Length, 14.5 mm.; anterior wing, 11.6 mm.

Male. Black. Apical joints of tarsi and under side of flagellum ferruginous. Stripe on inner margin at base of mandibles, labrum, clypeus, transverse supraclypeal mark and under side of scape, pale yellow. Pubescence of notum as in female, but hair of head and remainder of thorax dull ochraceous, slightly tinged with brown, becoming fuscous on upper part of frons and tinged with reddish on vertex behind ocelli. Hair of abdomen black, that of first two tergites ochraceous, tinged with brown, and tergites 2 to 4 with a paler, more whitish, apical fringe on each side. Hair of legs mainly light, like that of under parts of thorax, but becoming black on the middle and hind tibiae and basitarsi, except the long fringe on dorsal margin which is poorly developed on hind legs (about as in *C. hoffmanseggiae* Ckll.). Hair on anterior side of front tibiae and tarsi also darkened. Head shaped as in female, but eyes larger, the face moderately narrow or about equal in width to two-thirds the length of eyes. Eyes not diverging except below the widest part of clypeus. Clypeus more finely punctured than in female. Sculpture of head and thorax otherwise similar. Abdomen less shiny, the punctures of tergites stronger and much closer, the surface also more hairy, with the hairs longer than in the female and suberect. Mandibles shorter, the inner margin with

only two teeth, the apical tooth less elongate. Third antennal joint somewhat shorter than four following joints combined. Length, 14 mm.; anterior wing, 4 mm.

The hair on the notum of male paratypes varies to fulvous, but is still redder than in other Californian species, except in one much faded specimen.

Holotype, female, collected at Mariposa, California, June 18, 1938 (R. M. Bohart), the allotype at same place, June 13, 1938 (J. M. Ferguson). Also the following paratypes: One female, one male, Mariposa, June 13 (Ferguson and Bohart), and ten males, June 18 (R. M. Bohart); one male, Santa Paula, June 5, 1927 (collector unknown); and three males, Sespe Canyon, Ventura County, June 9, 1926 (collector unknown). The Sespe Canyon paratypes, except one, returned to Mr. Mont A. Cazier, and the remainder of the paratypes, except one, are in the Bohart collection.

DRYOTRIBUS AND MACRANCYLUS ARE NOT AMERICAN COSSONINE GENERA

(Coleoptera, Curculionidæ)

BY ELWOOD C. ZIMMERMAN

Bernice P. Bishop Museum, Honolulu, T. H.

To one working with American literature, it appears that the genera *Dryotribus* and *Macrancylus* of the Cossoninæ are American. The purpose of this paper is to call attention to the fact that they are not. In my recently completed report¹, I had occasion to inquire into the status of these genera, and it is worth while to present my findings to continental students in this more available journal.

Genus DRYOTRIBUS Horn

Dryotribus Horn, 1873, Proc. Amer. Philos. Soc. 13:433.

Thalattodora Perkins, 1900, Fauna Haw. 2:146. Synonymy by Champion, 1909, Ent. Mo. Mag. (2) 20:123.

This genus was erected by Dr. Horn for the reception of a species (*D. mimeticus*) found in Florida. In 1900 Dr. Perkins named the same insect *Thalattodora insignis* and based his description upon a single specimen found under a log on the coast of the Hawaiian island of Lanai. In more recent years the species has been found to have a wide distribution and has now been recorded from many places including Florida, West Indies, the main and outlying Hawaiian Islands, Wake Island, Australia, and the Ryukyu Islands, between Japan and Formosa.

¹ Zimmerman, E. C. Synopsis of the Genera of Hawaiian Cossoninæ with notes on their Origin and Distribution. Occas. Papers, B. P. Bishop Museum, Vol. XV, No. 25, pp. 271-293, 1940.

It is found in numbers breeding in driftwood thrown up on beaches and is evidently confined to such materials.

The species *D. mimeticus* has been considered American and to have been introduced from America to Hawaii. However, enough new data have now been accumulated to refute this theory. In 1916 Dr. Perkins described a second species of the genus from Midway, one of the outlying Hawaiian Islands. In 1925 Sir Guy Marshall described a species from the Sunda Islands, and in 1926 Dr. Perkins described the fourth species from another of the outlying Hawaiian Islands, Pearl and Hermes Reef. These data, I believe, prove beyond a doubt that the genus *Dryotribus* is a native of the Pacific and that the one species now found in America has been carried there from some part of the Pacific, perhaps Hawaii, through the agencies of man.

Both generic and specific synonyms should be added to the Leng Catalogue, and the species should be followed by the sign indicating an introduced species.

Genus MACRANCYLUS LeConte

Macrancylus Le Conte, 1876, Proc. Amer. Philos. Soc. 14:338.

Haloxenus Perkins, 1900, Fauna Haw. 2:148. Synonymy by Champion, 1909, Ent. Mo. Mag. (2) 20:123.

LeConte described this genus from specimens taken in Florida by Hubbard and Schwarz. In 1900 Perkins described his *Haloxenus*, which Champion showed was really *Macrancylus*, to receive a common insect found under logs and in driftwood on the coasts of the Hawaiian islands of Molokai and Lanai. It is evident that this situation is quite like that of *Dryotribus*. In my paper on the Guam weevils I described a new species, and when I compared the two previously described members of the genus, *M. linearis* LeConte and *M. immigrans* (Perkins) Champion, I found that there were not two species involved but only one with two names. A case of great discontinuity in the natural distribution of the genus was, therefore, eliminated by showing that *M. immigrans* was a synonym of *M. linearis*. Furthermore the discovery of a new species on Guam showed that *Macrancylus*, like *Dryotribus*, is a Pacific genus and not American. I now have a new species from Samoa and one from the Cook Islands.

This generic and specific synonymy should be added to the Leng Catalogue, and *M. linearis* should be marked as an introduced species.

STUDIES ON THE SPECIES OF OMUS, NO. 1

(Coleoptera, Cicindelidæ)

BY F. W. NUNENMACHER

Piedmont, California

Among my captures for the present year, 1939, I recognize what appear to be two new and interesting species of *Omus*, and take this opportunity to make them known.

Omus subcylindricus Nunenmacher, new species

Form elongate, parallel and slightly ventricose. Head a little narrower than the widest part of the pronotum, rather coarsely and densely rugulose. Antennæ long and slender, a little shorter in the female than in the male.

Pronotum as wide as long, widest at apical fourth (5 mm.); sides arcuate, straighter posteriorly and moderately convergent toward base, the latter 4 mm. in width; disk rather finely, densely and moderately deeply vermiculate-rugose, the vermiculations very fragmentary and short, in this quite different from all the other species that I have seen or studied.

Elytra in the male type 12 mm. long and 6 mm. in width behind the middle at posterior third. Sides arcuate from the base, parallel in middle two-thirds, thence arcuately converging to apex, the tip evenly rounded; disk coarsely and moderately, deeply punctured, the punctures becoming more crowded toward and along the sides, without granules, but with a minute short and smooth line at the bottom of each coarse puncture. The only evidence of foveæ are a few scattered extra large punctures. Legs rather long.

Female. The elytra are 14 mm. in length and 7 mm. in width.

Measurements of types. Male: length, 18 mm.; width, 6 mm. Female: length, 20 mm.; width, 7 mm.

Type locality: Santa Clara County, California. Variation in the length is from 17 mm. to 22 mm., and the width, 5 to 7 mm.

Holotype, male; allotype, female, and twenty-six paratypes in my collection. Nineteen specimens were collected on April 16, 1939; nine others on April 23, 1939.

So far I have found this species only in a locality about 400 feet long and 20 feet wide. It has the appearance of an *Amblycheila* at first glance, the elongate and parallel form being notable. The species belongs to the *Lecontei* group. Compared with its close allies, *lecontei* and *intermedius*, it is more parallel with the vermiculate-rugose sculpturing twice as fine and more crowded than in *lecontei*. The pronotum of *intermedius* has

only traces of such sculpturing. The distribution of this species appears to be very local and it will, in all probability, prove to be a scarce insect in collections.

Omus vanlooi Nunenmacher, new species

Apparently belonging to the *Edwardsi* group. The large females look somewhat like that species, but in general the black color is dull or flat and the vermiculate-rugose sculpturing will separate the two species.

Head a little smaller than the widest part of the pronotum; not so coarsely rugulose as in *californicus*, but more like that in *lecontei*. Antennæ long and slender, slightly different in the two sexes.

Pronotum with the sides evenly arcuate to the middle, thence almost straight to the base; surface thickly vermiculate-rugose, but not as deeply so as in *californicus*, more like that in *lecontei*. Measurements: Length 3.5 mm.; width 4 mm. at the widest point before the middle and 3 mm. at base.

Elytra coarsely and densely punctate, with no granules. At the humeri and towards the sides the punctures become deeper and closer. There are no indications of foveæ, only here and there a large shallow puncture. Legs rather long.

Male. Narrower and less ventricose with the antennæ slightly longer and the sides of the elytra less arcuate than in the female. The elytra measure 9 mm. in length and 5 mm. in width.

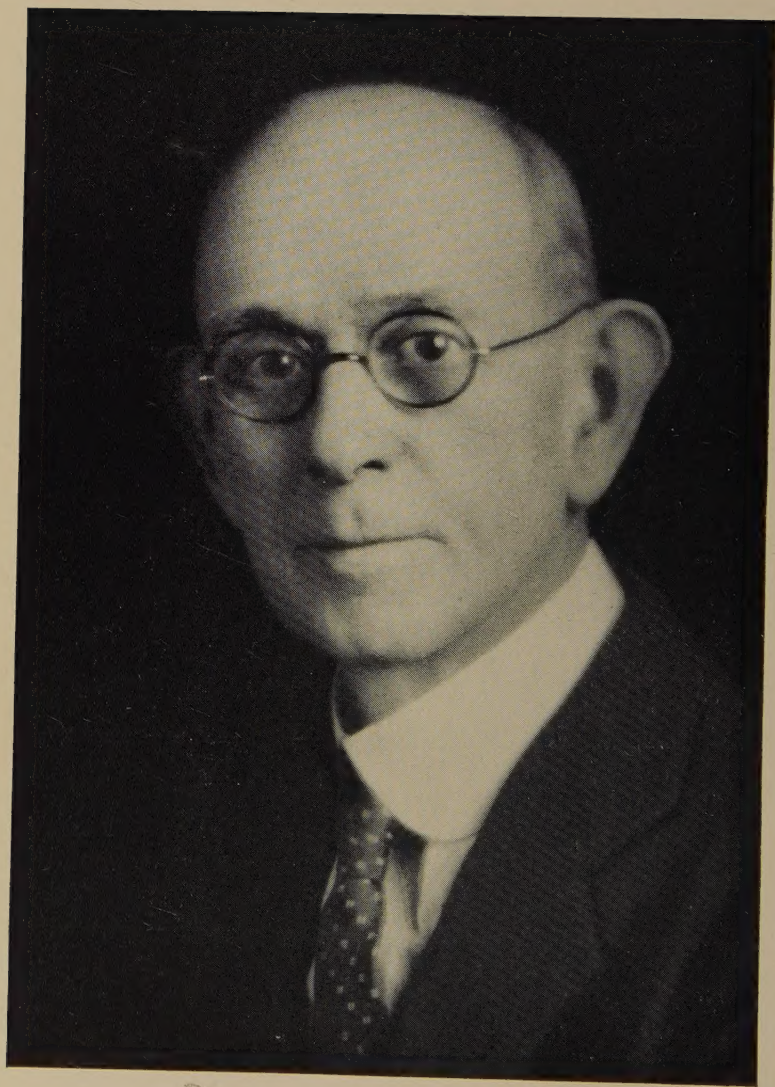
Female. Body broader and more dilated, a little ventricose; elytral apex a little more pointed than in the male and the sides more strongly arcuate. The elytra measure 10 mm. in length and 6 mm. in width.

Measurements of types. Male: 15 mm. in length and 5 mm. in width. Female: 16 mm. in length and 6 mm. in width. The paratypes vary as follows: Length 13 to 17 mm., width 5 to 7 mm.

Type locality. Butte County, California.

Holotype, male, allotype, female, and fifty-six paratypes in the author's collection.

The species is dedicated to W. C. Van Loo.



E. P. Vanduzee